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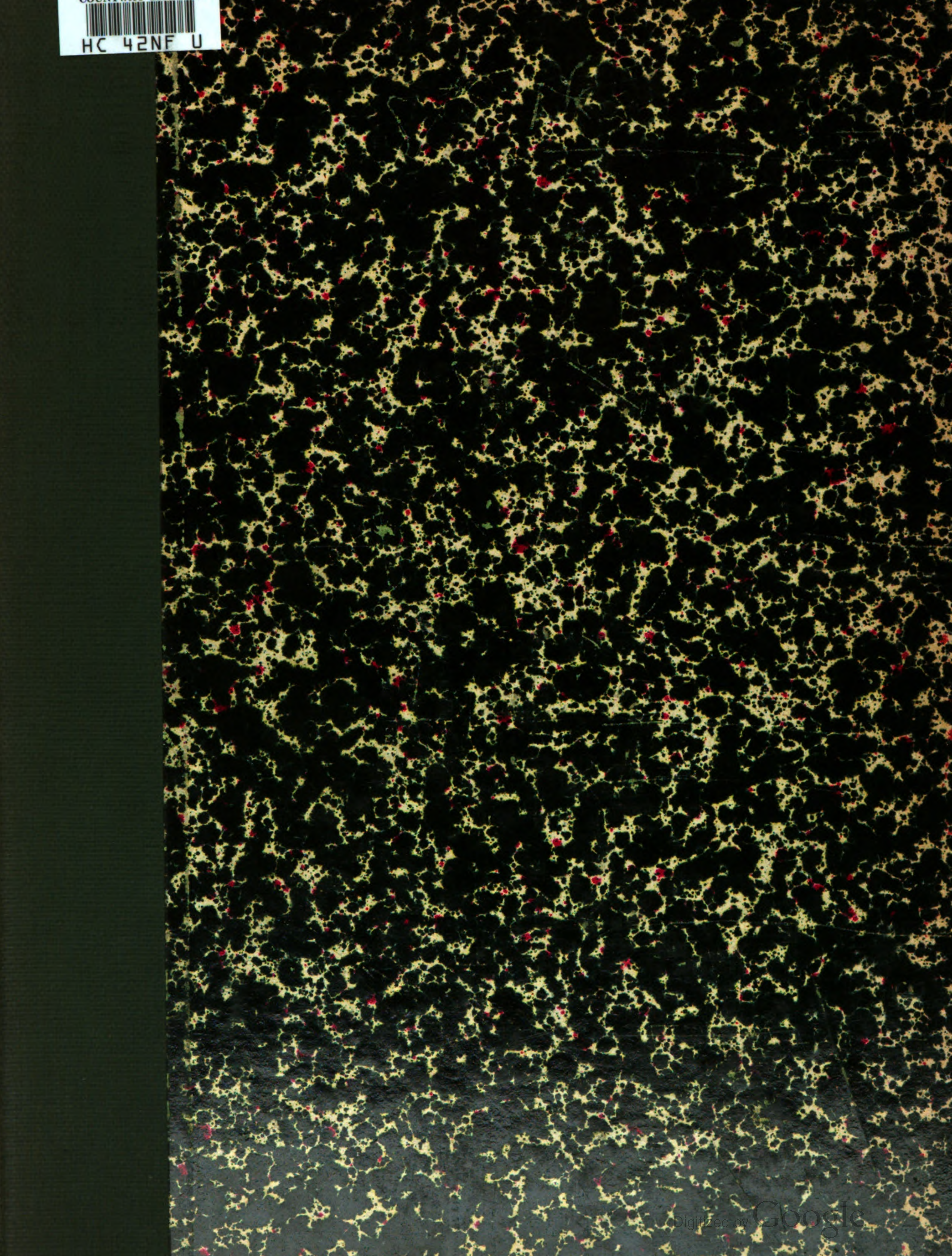

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A CONTRIBUTION TO THE STUDY OF THE RELATION OF EROSIONS OF THE CERVIX TO MALIGNANT GROWTHS OF THE UTERUS.*

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When approaching any matter of a more or less complex nature, we should first reduce it to its lowest common denominator, and then by very careful mathematical precision, so enumerate our clarified facts as to give us a result wherein the truth of the thing becomes self-evident. I purpose treating my subject in accordance with this principle, and do not think I can do better than by starting out with a brief description of the histology of the cervix.

A consideration of the cervix histologically simply comprises a review of the differences that distinguish it from the main body of the uterus, and these differences are found in the inner and outer coats, the middle coat being the muscular portion and practically identical with that of the rest of the organ. The inner or mucous coat of the cervix instead of being smooth like that of the fundus is thrown into folds. The glands of the fundus are single tubes and lined by low columnar ciliated epithelium of a not particularly active character, while those of the cervix are branched tubes, the epithelium, ciliated but much taller columnar and decidedly active in character. So active are these glands that they very often become distended with secretion when their outlet for any reason becomes occluded. These distended glands can sometimes be felt and seen. They have received the name of Nabothian follicles. In a normal virgin cervix the ciliated columnar epithelium extend almost down to the external os, where they more or less abruptly merge into the stratified squamous epithelium of the vagina; but the cervix that has once been lacerated by labor or otherwise, has the vaginal epithelium sometimes extending as high up as two-thirds the length of its canal, depending, of course, upon the extent of the laceration. This brings us to the consideration of lacerations.

I believe it is as common for the gynecologist or obstetrician to find a lacerated cervix as it is for the dentist to detect a decayed tooth. The majority of these lacerations, however, readily heal. The raw surfaces become covered with the actively proliferating vaginal epithelium with comparative rapidity. It is those extensive lacerations that suffer an inflammatory interference so that their normal healing course is disturbed that give rise to pathological conditions demanding attention.

It being my object to make this paper as brief and as concise as possible, I shall have to pass over the various pathological stages which occur in inflammation of the cervix. It is, however, opportune for me to interpose my theory as to the genesis of carcinomata in general

So far as epithelial new growths are concerned, there is one outstanding fact which experience, in spite of assertions to the contrary, has proved beyond controversy, and that is, that all carcinomas, whether of the squamous or the columnar cell type, have as a starting point some irritating influences. These may be traumata, toxins of certain microbes, or various chemical, electrical, thermal or mechanical agencies. These agencies are all producing the identical effects, in a lesser degree, of *x*-rays or Radium.

What applies to the atom of inorganic substances applies with more force still to the atom of organic substances. All living matter, all protoplasm, vibrates according to a certain rate of movement which is peculiarly its own. The agglomerations of corpuscles which form the atoms of an epithelial cell vibrate within their own sphere at a given rate, and that rate of vibration—the velocity of corpuscular movement within its atomic walls—determines the nature, the attributes, the potentialities of growth, of decadence of that particular cell. Each corpuscular unit vibrates in unison with its companions; the process is a rhythmic one, and the more perfect the vibration the more even is the growth and development of that particular unit, and the more specialized is that unit. This is the one really essential, universal property of matter, whether living or non-living. Beauty of form—perfection—is found only in harmony, and protoplasmic life is no exception to the rule. Thus, as stated by Williams, "growth is due to the tendency of like units to unite, and of unlike units to separate," or as Spencer has it, "growth is an integration with the organisms of such environing materials as are of like nature with it." Or to put it in electric parlance, corpuscular units vibrate in unison only with units which are animated with the same rate of vibration. But let us by some means or other alter the rate of vibration of that unit, let us say, introduce an element of radio-activity—which we have seen produces a peculiar instability of corpuscular motion—then the nature of that unit alters. Where harmony—perfect rotation existed, chaos reigns. If the unit be a highly specialized epithelial cell, it may become suddenly animated with remarkable activity of a disordered nature; it may wax strong and multiply exceedingly; it may proliferate at an abnormal rate leading to the production of excrescences, pappillomas, warts, or it may die, killed at the outset by the force of the stimulus, it may change its very nature in a remarkable and fundamental manner. Under the influence of radio-active changes, we see its fine protoplasmic granules revert, by a curious retrogressive movement, to its coarse granules of its primordial prototype, the ameba—the protozoa—and it then acquires the activities, the energies, the disordered proliferative tendencies which so markedly characterize new growths of pre-natal origin. In another word, the "uni-cellular cancri" has been born and the parasitic stage attained.

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* Read before the Maimonides Medical Society.

The age incidence is of material importance in cancer genesis. Probably there are obscure forces which govern metabolic changes, and sexual affinities are strong enough in young subjects to counteract the influence of stimulation, so that radio-activity will merely produce proliferation without fundamentally altering the nature of the cell itself.

When a group of epithelial units are nearing senescence, when having attained the highest degree of specialization possible, they have almost completed their life cycle, long continued stimulation of an irritative kind must mean either somatic death to cell life or change of nature. Such a cell is, indeed, incapable of maintaining its integrity and to successfully combat the depressing influences which surround it. The forces which have governed its full development are near well expended, and it has attained that period of instability which always precedes degenerative changes. Now what are those changes? On what lines should we expect them to take place? They can be only on those of the universal law of evolution, i. e., a return to the primitive type of cell from which the epithelial unit of the high class mammalian has evolved. "That primitive protoplasmic unit" Sir Henry Butlin calls the "uni-cellular cancri," and would like us to believe that it is an independent organism, born de novo and alike to the protozoa. It is possible, but if so, the cancer cell is not a new organism—a new creation of animal being. Its whole life history points it out to be a higher epithelial cell which has degenerated and reverted to its ancestral prototype—the uni-cellular protozoa. If not so, why should cells found in cutaneous cancers retain so many of the biological characteristics of the parent tissue, or those of the stomach and intestines reproduce the cylindrical epithelium of their glandular structures?

With that reversion to the parental type it acquires anew all the qualities as well as defects of that uni-cellular organism. The qualities are, intense activity, rapid proliferation and osmosis. The defects are, disordered growth, imperfect organization, precarious existence. The stage of parasitism is complete—the parasitism of a monstrous child thriving on the life-blood of its parent. Filiation is clearly manifested by the new organism attempting in a gross and imperfect way to build tissue-like substances similar to the cells from which they originally sprang. Thus, metastases of mammary cancer are the caricature of the parental tumor growth—so are those of the liver and other organs. Morphologically, therefore, the abortive attempt on the part of the cancer cell to imitate the original tissue from which it is derived, is to us the certain proof: 1. That the cell is actually derived from previous epithelium and is not a new importation, microbic or otherwise. 2. That the protozoa-like nature of the cancer is in reality nothing but the reversion of the epithelial cell to its ancestral prototype, the ameba.

In view of this reversion I ask again, what is tumor growth? What is carcinoma? We answer, the attempt under stimulation and irritation on the part of an organic cellular unit nearing senescence to reproduce its parental prototype and begin anew its life cycle. In other words, it is the attempt of an organism which has attained majority and senescence to rejuvenate itself. Thus, what we call degenerescence is, on the contrary rejuvenescence. Thus is explained the reason why epithelial tumors arise not in youth, but in old age.

I realize that this whole argument of cancer genesis is based on the hypothetical notion of the electronic nature of matter. But notions which are tentative to-day may be to-morrow sober, scientific facts. Indeed, some of them are already so. The veil which still covers the mystery of matter is rapidly lifting. Radio-activity, the transmutation of the elements, are the portals which will give us ere long a glimpse into the vast stores of intra-elemental and intra-atomic energy—nay, may even explain the "Riddle of the Universe."

It is necessary now to lay some stress on the following facts:

1. The glands of the cervix possess marked functional activity.

2. The cervix is even under normal conditions peculiarly subject to injuries and irritations of one form or another, and is therefore—

3. the most common seat for inflammation and its attendant pathological changes in child-bearing women.

I should now like to direct attention to the similarity existing between the cervix and the mammary gland, in view of the preceding facts. In the mammary gland we have also the marked functional activity. The mammary gland is also subject to the various forms of injuries and irritations, and in the same way do we have the different degrees of inflammation with its varied sequelae. Acute and chronic mastitis are fairly common occurrences in child-bearing women.

We have come to understand by a more or less slow process of enlightenment, that carcinomatous conditions are very frequently evolved from preexisting inflammatory states. This statement may sound very commonplace, but I shall make no apology for it, but rather wish I could encroach on your time by heaping illustration upon illustration, observation upon observation, in order to emphasize this point. It is a strange truth, that, though we may be cognizant of a fact, it by no means follows that we fully, or at all realize it.

Present day pathologists have coined the term "pre-cancerous stage," which can be defined as that chronic inflammatory condition which precedes the onset of malignancy. To substantiate this observation I could quote such authorities as Victor Bonney, Waldeyer, Ribbert, Borrman and a score of other distinguished observers, but I do not consider it necessary, as I believe every practitioner has been able to observe this fact in his own clinical experience. I shall omit the vast amount of data which we possess, as regards the intricate cellular pathology concerned in this pre-cancerous stage.

We shall not go back to the cervix. A great many practitioners unfortunately fail to distinguish between simple erosion and an ulceration. I believe it was Emmett who said that no ulceration of the cervix should be looked upon as benign. This also is a simple truth, but it is a truth that must be realized and remembered. I have seen a number of practitioners call a cauliflower growth of the cervix a benign erosion.

In connection with the similarity existing between the cervix and mammary gland previously noted, there is another fact that recent studies in pathology have brought into view. We have found that the organs of the greatest functional activity are those most frequently affected by malignant changes as well as by inflammatory disturbances, in fact, the greater the functional activity the greater is the tendency to these changes. From our histology we know that the cervix is functionally more active than the fundus of the uterus. Now note what the eminent committee appointed by the American Medical Association to investigate cancer of the uterus reported at Boston in 1906: "Cancer of the uterine cervix is much more frequent than of the body of the uterus, and is much more malignant." I think we shall cover the whole ground pretty well if we particularly bear in mind the general principle that chronic inflammatory conditions tend to give rise to malignant changes in direct proportion to the duration of the inflammation and the protoplasmic activity of the part affected.

The following is culled from the committee report above mentioned: "It is evident that all women suffering from uterine bleeding or other symptoms referable to the uterus should be examined as soon as possible, and if the diagnosis is not clear the uterus should be curetted or a small piece of cervix excised and not thrown away, but preserved in 10% formalin or ordinary alcohol and sent to a competent pathologist. All symptomatic aberrations referable to the generative organs of women about the menopause should be looked on as a possible beginning of malignant disease, and immediate examination should be urged.

"If a suspicious area is found, prompt measures for its certain diagnosis by the microscope may be instituted. Authentic cases of complete eradication of undoubted cancer of the cervix are so numerous as to leave no doubt that, if the diseased tissues are completely excised and if implantation at the time of the operation is avoided, a permanent cure is not only possible but also probable."

Diagnose your lacerations and erosions early and look after them. Neglect in these cases is the cause of all the mischief, particularly in women of the carcinomatous age. A great deal is being done to educate women by popular instruction how to recognize the early symptoms of malignant changes of the uterus. This sort of campaigning has brought about wonderful results in some parts of the world, which is significant in itself. And I firmly believe that if the physician would look after every lacerated or eroded cervix that he encountered and render prompt and radical treatment in every case, the number of carcinomas of the cervix and uterus would be greatly diminished, and I am convinced that an inoperable case of uterine carcinoma would become a rarity.

I shall report one case, typical of a series that have occurred in my private practice during the last ten years:

Mrs. K. Age 29. Married 5 years. Two children, youngest 19 months. Family history negative. Complains of general weakness, and an offensive leucorrheal discharge. Menstruates every 21 days. Examination showed a bilateral laceration of the cervix, markedly eroded. The patient submitted to operation March 6, 1916. The cervix being rather elongated, I decided it was preferable to amputate than to repair. Microscopic examination showed proliferative changes in the glandular structures. The glands were increased in number, enlarged and showed a tendency to coalesce. Diagnosis, early malignancy. Condition, September, 1916, seven months following the operation, negative. The clinical and the microscopical pictures in this case were totally different!

310 FINE ARTS BLDG.

SIX MONTHS OF WAR SURGERY IN A BASE HOSPITAL IN GERMANY.

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The following is a brief account of the relief work done by the first physicians' expedition sent to Germany under the auspices of the American Physicians Expedition Committee.

The expedition consisted of four surgeons—Dr. King, Dr. I. Brooks, Dr. L. Mathesheimer and the author as chief surgeon—and four nurses.

We sailed on September 9, 1915, and arrived safely in Germany on the 27th of September. After communicating with the Ministry of War in Berlin we were assigned for duty to the Reserve Lazarett, Oppeln in Lower Silisia. Oppeln is a town of 30,000 inhabitants and an important railroad center, railroad lines radiating from here to the north, the south, the east and the west. The town is situated only an hour's auto ride from Czenstochowo, the first important Russian town across the border. It is the seat of the county official (Regierungs-Praesident) and boasts of three hospitals in times of peace. A lying-in hospital and two smaller hospitals run by Catholic sisters.

In the beginning of the war the town was very near the fighting zone. Its importance as a hospital center was therefore apparent. Two of the four schools and some other public buildings had been turned into hospitals so that 1,700 beds were available.

We arrived at Oppeln on the 16th of October, and the following day our unit was assigned to Public School 3/5, a new large three-story building containing 300 beds and destined to receive only severely wounded. It constituted the surgical division of the Reserve Lazarett Oppeln. Besides our surgical hospital the following departments had been created: (1) Department for internal diseases. (2) Department for skin and venereal diseases. (3) Department for tuberculosis of the lung. (4) Department for convalescents. (5) Orthopedic department. The rooms in our hospital were large and well ventilated, each containing fifteen to twenty beds, according to its size. In the basement, the kitchen and a bathroom with tubs and hot and cold water douches had been established. A large room with plenty of light was used as bandaging room. The corresponding room on the second floor was turned into an operating room. In the hall on the second floor a large space had been divided off and turned into the *x*-ray room and the developing room. Another large room on the same floor was used as a mechano-therapeutic department, with the necessary pendulum apparatuses, hot-air and electro-therapeutic machines. A modern *x*-ray apparatus and the machines for the mechano-therapeutic department were installed by the expedition.

On October the 18th, the second day after our arrival in Oppeln, our first wounded arrived from Bijela, near Brest-Litowsk in Russia. The men were transported in a hospital train carrying 300 wounded, of which 200 were destined for our hospital. From October 18th to March 31st there were treated by our expedition 727 wounded. Of these were 493 injuries by shot and shell. The rest were simple fractures, hernias, appendicitis cases and minor surgical ailments, sent into the hospital from the barracks at Oppeln. Strange to say we had no soldiers wounded by bayonets or other cutting weapons. Among these 493 wounded soldiers ten had bullet wounds of the head with injury of the brain, four were shot through the spine with more or less wounding of the spinal cord. Twenty-two had received wounds of the head, face and neck without injury to the central nervous system. Seventy-four were shot through the chest, abdomen and pelvis. One hundred and one were wounded about the upper extremity, 264 about the lower extremity. Fourteen wounded suffered from a paralysis of peripheral nerves of the upper and lower extremities in consequence of wounds of the median, the ulnar, the radial, the sciatic and the peroneal nerves. Only three gun-shot wounds of the large vessels were observed resulting in aneurism of the femoral artery, of the subclavian artery and of the innominate artery, the last being an arterio-venous aneurism. Of these only the femoral aneurism was operated upon. In the other two the symptoms were so slight that it was deemed best to let well enough alone.

1. *Gun-shot wounds of the skull with injury of the brain.*—As the number of wounds of the head by gun fire and artillery fire has been very great, certain principles, won by experience, have been laid down in course of time in the treatment of these wounds. The severity of a gun-shot wound of the skull depends very much upon the distance from which the shot is fired and upon the angle of impact of the bullet and whether the bullet penetrates the brain or not. We distinguish the following types:

(1) Tangential shots. (Fig. a.)
(2) Segmental shots. (Fig. b.)
(3) Diametral shots. (Fig. c.)

In the first two types the bullet passes in and out; in the last type it may pass straight through the skull, or it may become arrested and inbedded into the brain.

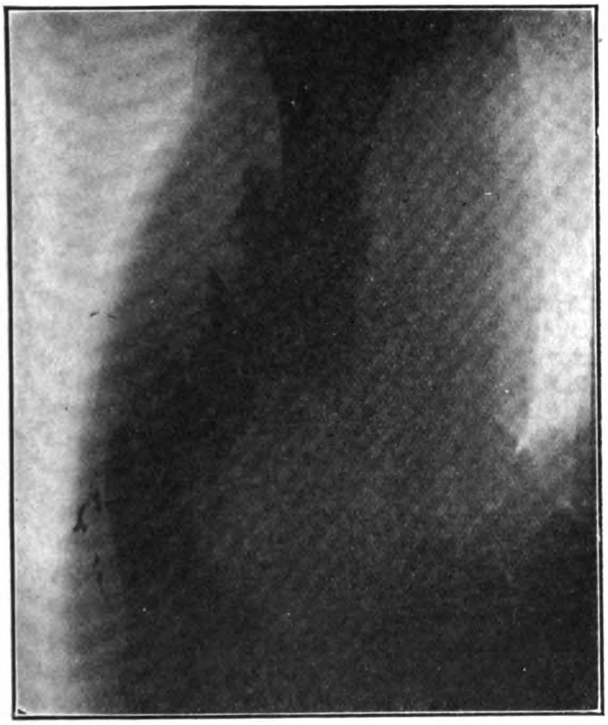

Fig. 1. Shattering of bone by Russian "explosive" bullet.

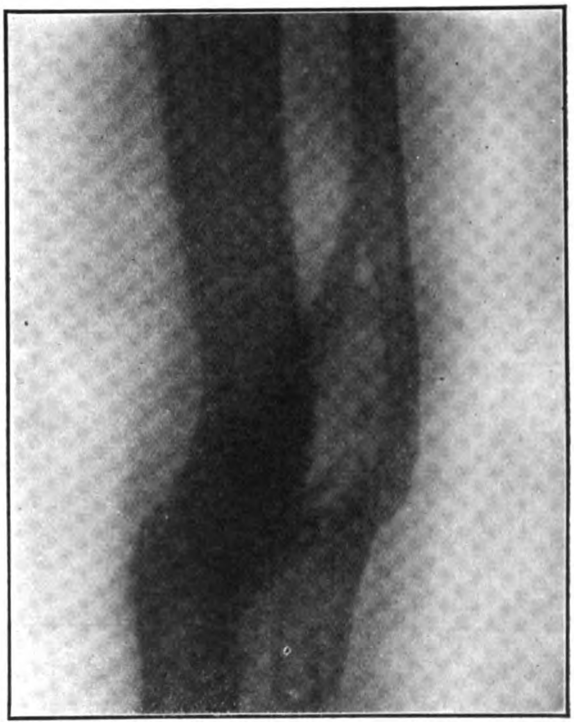

Fig. 2. Gun-shot fracture of tibia and fibula, healed.

The immediate mortality of the skull wound is high, but a good many of these cases are not immediately fatal and reach the field hospitals quickly, usually one or two hours after the wounding. The highest mortality show the diametral shots on account of the great destruction of brain substance and the considerable hemorrhage. Exceptions, however, occur; I can mention two that recovered.

Skull injuries are all operated upon immediately in the field hospitals. In the light cases, in which the skull wound and the defect in the dura is small, the edges of the wound are excised, splinters of bone and other foreign material are removed, and a tampon is lightly inserted, covering the dura defect. This treatment has been advocated by Tillman and is in the majority of cases successful. The danger of infection of subdural and arachnoidal space is not great, as the brain will always prolapse somewhat through the dural rent and thereby close off the subdural space.

Entirely different is the situation in those cases of tangential and segmental shots in which the destruction of bone and of brain substance is considerable. In these cases the flow of cerebro-spinal fluid and the loss of brain substance demand a different course. Here the subdural and arachnoidal spaces are wide open; the brain will not protrude on account of loss of substance, and all doors are wide open to invite meningeal infection if the dural defect is not closed.

The method of procedure therefore is as follows: Local anesthesia with ½%-1% novocain, with addition of 20 drops of adrenalin solution, 1 : 1000. If this solution is injected into the scalp a preliminary hemostatic Haidenhain suture is not necessary. It also controls the often severe bleeding from the brain. The ragged and contused edges of the scalp are excised, all the splinters of bone, destroyed brain and foreign substance are carefully removed. If the bullet is lodged in the brain the canal is explored and the bullet, if easily found, removed. The loss of brain substance is often considerable, and it is necessary to fill out the defect with some other tissue. This is done by free transplantation of fat, usually subcutaneous fat of the thigh. The defect of the dura is closed by free transplantation of fascia, the smooth glistening surface, normally in contact with the muscle, turned towards the dura. The fascia transplant has to overlap the dural edges by at least ½-1 cm. and is fastened to the dura by fine sutures. The wound of the scalp is closed. To avoid a possible hematoma a small rubber-tissue drain is inserted between the sutures at the angle of the wound.

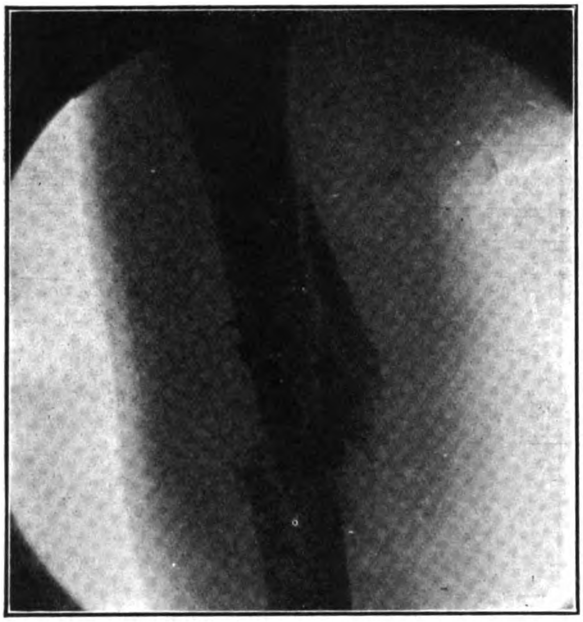

Fig. 3. Fracture of femur; rifle bullet.

In the beginning of the war most of the skull wounds had been treated openly with the dire result of almost sure infection in most of the cases. Although the opinion of some surgeons still differ as to the advisability of primary suture of such injuries, many surgeons have had most gratifying results with it. Kaeger reports 14 cases which all healed by primary union; Holtz, Barany, Jeger, Stich and Schneider also report good results. It is self-understood that only fresh cases, and only such in which the wound is relatively little soiled, offer favorable results. Cases which reach the surgeon on the second day or later should be treated by the open method.

It lies in the nature of these injuries that such cases reach the base hospital after they are practically healed. We had, however, to deal with the late manifestations of these brain injuries after the patient had recuperated from the primary operation.

Among the ten cases of gun-shot wounds of the skull, which had been operated upon in the field hospital, there were three cases which showed late symptoms calling for relief. All three had received tangential shots. The wounds were healed.

Case I. H. S. Wounded August 22, 1915. Gun-shot wound of skull. Operated upon the same day in the field hospital. Sent to Oppeln on October 10, 1915. There is a wound over the left parietal bone, corresponding to the arm and leg center. It is 6 cm. long and 2 to 2½ cm. wide. The scar is firm and pulsating. He had had a complete paralysis of the right arm and leg. Mobility has returned, but a severe spasm of right arm and leg has developed. All reflexes are exaggerated, severe ankle-clonus and jerky spastic gait are present. He suffers from headache and dizziness.

Operation, December 29, 1915. Excision of old scar and closure of defect in skull by skin-periosteum-bone flap after Mueller-Koenig Primary union. February 2, 1916. General condition of patient much improved. Headache and dizziness have disappeared. Spastic gait so much improved that he could walk with support of a cane.

Case II. T. S. Wounded near Duenaburg October 30, 1915. Gun-shot wound of right parietal bone. Operation on November 22, 1915. Admitted to Reserve Hospital, Oppeln, December 12, 1915. There is a defect in the right parietal bone over arm and leg center 5 cm. long and 2 to 2½ cm. wide, the wound is still granulating. There is still some loss of power in the left arm and a spastic condition in the left leg. Complains of headache and dizziness. January 1, 1916, suddenly seized by a short but distinct attack of cortical epilepsy which started in the muscles of the left thumb. January 28, 1916, two more attacks. Roentgenogram shows single spicule of bone projecting into brain. January 31, 1916, operation. Excision of old scar. There is a prolapse of the brain the size of a walnut. The brain substance is tightly adherent to the dural scar. After mobilizing the dura and inspecting the cortex a splinter of bone, 3 : 4 mm., is found imbedded in the brain. It is carefully removed with forceps and the finger. Brain pulsates normally. Edges of dura can easily be brought together by suture. Closure of bony defect by osteoplastic flap after Mueller-Koenig

Primary union. After the operation the patient had spastic cramps in arm and left leg, but no disturbance of consciousness. On the seventh day after getting out of bed he had another regular attack of cortical epilepsy which was light and lasted about 5 minutes. February 23, 1915, attacks have not repeated themselves. Patient is up and about, but still complains of feebleness in arm and occasional headaches. The osteo-plastic flap has healed in firmly. March 3rd, had another attack lasting 5 minutes. He is still in the hospital.

CASE III. F. M. Wounded on January 1, 1915, by gun-shot fire. Operated upon in a field hospital. After being wounded he was unconscious for two weeks. Right after injury he developed attacks of cortical epilepsy. He has a distinct aura, becomes dizzy and immediately afterwards, fingers of right hand commence to twitch and his right arm is thrown into a flexor-spasm, whereupon he becomes unconscious. These attacks have continued for two weeks after the operation and abated somewhat, but subsequently his condition became worse again, and he was therefore admitted to the hospital on January 25, 1916. Status. Over the left parietal bone there is a somewhat retracted scar 7 cm. long and of bluish color. Patient complains of severe dizziness and constant headache. Examination of eyes reveals nothing abnormal. There is no paralysis of any of the extremities. Two *x*-ray pictures show no bone splinters or other foreign bodies. February 4, 1916, operation. Excision of scar. On exposing the dura no pulsation of the brain is noticed. On careful palpation there is, however, a faint pulsation to be felt. On incising the dura a cyst the size of a large hazelnut is found. After opening it a few cc. of amber-colored fluid escape, whereupon the brain instantly resumes its normal pulsation. The thin walls of the cyst are carefully removed, the dura is partially closed and two silkwormgut-threads are inserted for drainage on account of some oozing. The scalp is closed over the defect and the silkwormgut-threads let out between sutures. February 7, 1916, wound is dry; no discharge of cerebro-spinal fluid. March 3, 1916, there is a small granulating wound with a small fistulous opening leading below the scalp. General condition is satisfactory; has had no attacks up to date, but still is a little dizzy. His headache has markedly improved. He is still in the hospital.

Indication for osteo-plastic operations of the skull.—No case should be operated upon before the wound is completely healed. Indication for the plastic operation is the defect of the bone and the presence of the scar, which are the causes of cortical irritation and psychical derangements. Autoplasty is the procedure of choice. Heteroplasty has been almost discarded, at least in Germany. Cortical scars and areas of circumscribed edema in the pial or arachnoidal membranes have to be excised. The ensuing loss of substance must be replaced by a corresponding piece of subcutaneous fat, which is laid into the defect.

Injuries of the inferior maxilla.—The mortality of injuries of this kind has been as high as 50 per cent. in former wars. The number of gun-shot wounds both of the superior and the inferior maxillary bone has been considerable and from the very beginning of the war, the importance of co-operation between the surgeon and dentist had become clear and imperative. Gun-shot and shell wounds of the superior maxillary bone do not present themselves for treatment in such numbers as the bullet injuries of the superior maxilla have a much higher immediate mortality on account of concomitant injury to the base of the brain.

Due to the establishment and organization of a great number of special hospitals throughout Germany, excellent and, in some cases, remarkable results are achieved by the cooperation of surgeon and dentist in these cases. The destruction of tissue is sometimes very considerable and the danger of infection from the buccal cavity very great. Therefore an active surgical therapy is necessary. All loose bone fragments must be removed, but each piece of bone that is still in connection with the periosteum is carefully saved, as it may heal in, even if suppuration is present. The fragments are held together by interdental splints of various shapes and kinds. If there is loss of substance, bone plastic operations and soft part plastics are performed after the wounds are clean.

I personally have seen among my own material only three cases. These were practically healed and needed only the removal of small sequestra.

Wounds of the neck, chest, abdomen and pelvis.—Of these injuries seventy-four cases were treated.

Among the gun-shot wounds of the neck one was an injury of the larynx. The bullet had been fired from the flank and had torn away the anterior wall of the thyroid, leaving a big gaping wound. The soldier was admitted carrying a tracheal tube which was inserted through the wound. His condition was pretty fair, so that no active interference was indicated. As he had worn the tube for almost four weeks, it was removed. On closure of the wound with the finger it was noticed that there was no impairment of breathing and that he was able to speak with a whispering voice. After two weeks the wound was clean and had contracted somewhat, so that I was able to close the defect in the cartilage by a plastic operation. This was done under local anesthesia in the following fashion: The borders of the defect were freshened and a U-shaped flap of cartilage, 1 cm. x 1½ cm. in size, with the perichondrium attached, was turned downward over the defect and the edges of the perichondrium stitched to the perichondrium, close to the defect. The skin wound was closed. A few strands of silkwormgut were inserted between the sutures for drainage. A few days later, one of the sutures had to be removed on account of a slight skin infection. The flap healed in, however, and the wound closed. Laryngological examination three weeks after operation showed a diffuse reddening of the vocal cords. Both vocal cords moved normally. His voice had improved considerably, although he still spoke in a whisper.

Among the bullet wounds of the chest only two cases needed surgical interference. The great majority of them had healed without any inflammatory reaction by rest in bed under morphin treatment and the application of an ice-bag.

The first of the two cases came in with a large hemothorax, a good deal of dyspnea and some fever. The hemothorax was aspirated and bloody fluid withdrawn with the result that the patient made a good recovery and could be dismissed after about five weeks. The second case was a shell wound of the back with complicated fractures of the sixth to ninth ribs and an injury to the lower lobe of the lung. He had been operated upon in a field hospital, and was admitted to our hospital with a large old empyema cavity. Here a thoracoplastic was done with a good result.

Among these chest wounds were found two cases of traumatic aneurism. One of the wounded had a spurious aneurism of the second portion of the subclavian. The aneurism was small and was found only after careful examination, as the patient complained of no symptoms. The second case had been shot through the chest near the jugulur. A loud bruit could be heard over the whole chest. There was quite a distinct pulsation above the jugulur and just above the sterno-clavicular joint. The sound was conducted into the axillary artery and the carotid on the right side. We probably had to deal with an arterio-venous aneurism of the innominate artery and vein.

Both cases had no subjective symptoms, and their general condition was excellent. There was no indication for surgical interference at the time. Bullet wounds of the chest have a fairly good prognosis, if no large vessels are injured and no infection is carried into the pleura or lung. They heal quickly under rest, morphin and the application of an ice-bag. Most of the chest injuries are followed by a bloody exudate in the pleural cavity. In a fair proportion of these cases the blood will be absorbed within the first two weeks. In the lung there are found in cases that came to autopsy slight areas of necrosis with only slight signs of inflammatory reaction in the lung tissue itself. Bloody expectoration is always present, and in the majority of the cases it stops after three or four days. The treatment is therefore conservative, with the exception of the injuries by shell-fire. These, however, are to a large extent quickly fatal and only a comparatively small number of them will reach the surgeon.

Combined injuries of the thorax and abdomen are comparatively frequent. Their mortality is of course much higher. I cite the following case because of its unusual and interesting features.

K. was struck by rifle bullet while lying down. The bullet entered the left supraclavicular groove, traversed his chest and passed out in the right flank two fingers' breadths below the border of the ribs in the posterior axillary line. He had been treated for some time in a field hospital and was then admitted to our hospital. His general condition was good. Both wounds had healed. No abnormal signs of lung or heart. He complained of pain in his abdomen, aggravated by the ingestion of food. Abdominal examination revealed a large cystic tumor that occupied the whole abdomen from a hand's breadth above the umbilicus downward. It was cystic and gave the impression of a large hydro- or pyonephrotic sac. Urine showed no abnormalities. Catheterization of both ureters showed a normal flow from both kidneys. The color of the left, however, was very much lighter, almost like water. Operation revealed a big cyst that was adherent to the lower surface of the right lobe of the liver, to the omentum and to the parietal abdominal walls in both flanks. It dipped down into the pelvis. Aspiration showed bile-stained fluid. After emptying about five liters of brown chocolate-colored fluid the cyst wall was easily removed by blunt dissection. A few large vessels coming from

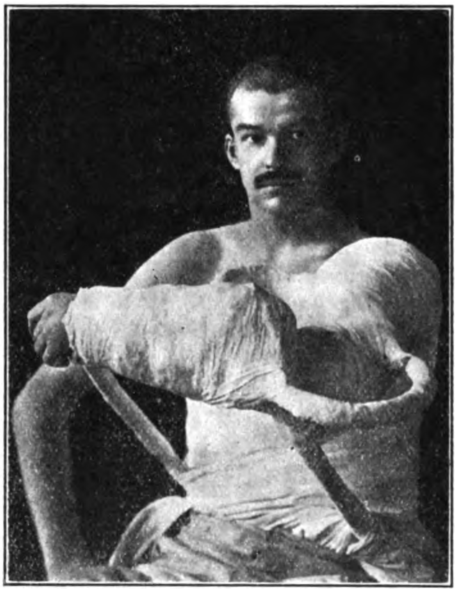

Fig. 4. Dressing for extensive injury of elbow.

the omentum had to be tied. The shelling out of the sac was a little more difficult in the region of the kidneys. Finally, it became clear that the cyst wall was attached to the lower surface of the right lobe of the liver by a pedicle the size of a thumb. At the point of insertion of this pedicle was a scar in the liver tissue. We had, therefore, to deal with a biliary pseudo-cyst caused by a bullet wound of the liver. A small tampon was laid against the liver scar and a rubber drain inserted into the pelvis. He had no reaction after the operation and made an uneventful recovery.

The mortality of the abdominal wounds has been high and the prognosis especially bad if conservative treatment was instituted. The experiences in this war, at least on the German side, have shown that immediate laparotomy gives the best results, provided this is possible. This of course depends a good deal on external conditions, whether a troop is constantly moving or whether trench fighting is going on. Sauerbruch reports 40%; Laewen, who was enabled to operate at an average of 5½ hours after wounding, 48%, and Kraske, 51%, of cures in injuries of the stomach and intestines. In these cases the best organized army medical corps will have the best results.

Bladder injuries.—Among our cases were five gun-shot wounds of the bladder. They had been operated upon in a field hospital by suprapubic cystotomy or came to us with a permanent catheter. Two of the wounded had a perivesicular abscess communicating with the bladder, which, however, healed by bladder irrigations, and one had a recto-vesical fistula. An attempt to close it by a simple operation failed.

Bullet and shell wounds of the upper and lower extremities.—There were treated 101 injuries of the arms and shoulder, and 264 of the thigh and leg; *i. e.,* two and one-half times as many injuries of the lower extremities as of the upper extremities. Wounds by rifle bullets and shells present with a few exceptions one common feature—infection. I could observe only a few rifle and shrapnel bullet wounds which had healed without infection, among them a shrapnel injury of the knee joint, with a comminuted fracture of the patella, and an oblique fracture of the epiphysis of the femur. There existed a bony ankylosis of the knee, which was subsequently operated upon. The patient had normal motion after three months. The extent of the injury of the bone and the soft parts vary greatly. The destruction of bone depends upon the distance from which the shot is fired and the manner in which the bullet strikes the object. The wound of entrance is usually small whereas the wound of exit presents a large gaping opening with laceration. This is especially marked in bones that are situated immediately below the skin, as the tibia and the radius or ulna. In the injuries of the thigh the wound of exit is often not much larger than the wound of entrance, but near the bone the soft parts are frequently lacerated to such an extent that big cavities are formed in which a number of fragments of bone lie, which were carried into the soft parts by the impact of the bullet. In these instances large hematomata may be formed. Roughly speaking, we can distinguish three types: (1) The bullet has grazed or penetrated the bone without disturbing its continuity. (2) The impact of the bullet has caused a fracture of the bone without comminution. (3) The bullet has caused widespread shattering and splintering of the bone with innumerable fragments and considerable laceration of the soft parts.

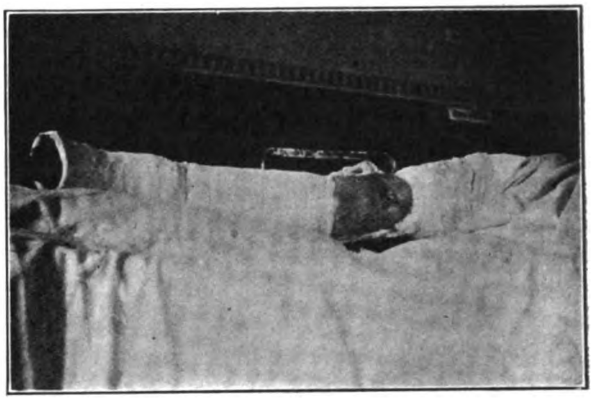

Fig. 5. Dressing for extensive bullet wound of knee.

The wounds made by shell-fire were distinguished by the severity of the comminution and laceration and were so various in character from each other that it was not possible to arrange them into types.

As stated before, our cases were mostly infected, and men had been wounded one week to four weeks before they came into our hospital. There was in the hospital a number of cases of chronic osteomyelitis from wounds received several months before.

Treatment.—The severe infection always necessitates a rather active therapy. All abscesses and pockets have to be carefully located and must be laid open widely. Bone fragments that seem to be impaired in their nutrition must be removed. This, however, must be done with circumspection, as a good many of the fragments will heal in in spite of the infection. I have seen fractures consolidate where the bony destruction was so great that the hope of restitution seemed to be a forlorn one. The wounds are drained with rubber tubing and loose gauze dressings are applied. Over the gauze are laid several layers of "Zellstoff" to take up the usually abundant secretion. Of great importance is proper fixation. The ideal means for this purpose is the plaster dressing. The wound area is left free and the gap bridged over by iron bands (Fig. 5). In this fashion the patient can easily be dressed without pain. Moreover, fixation is the sovereign means to combat fever. Time and again I have seen the patient's temperature come down to normal two or three days after the plaster cast had been put on.

In injuries of the shoulder and elbow joints the arm should be put up at right angles to the thorax and the plaster dressing should take in the chest, the arm being supported by iron girders (Fig. 4). This is the best way of combating atrophy of the shoulder muscles. In severe infections extension should be used with care. Forcible reduction of fragments should never be attempted. It is better to wait until the wounds are healed and the fracture has consolidated. If the deformity and shortening are great enough to impair function, osteotomy and nail extension is the proper procedure. In fracture of the tibia and fibula, where extension was indicated, I have made use of a wire pushed through the soft parts immediately behind the Achilles tendon and resting on the oscalcis. This procedure is very simple; can be performed under local anesthesia. It gives good results.

In bullet injuries of the knee joint with severe infection and destruction of the condyles of the femur or the head of the tibia, I have opened the joint after Mayo, removed the destroyed bone and put up the knee flexed at right angles. After subsidence of the infection, and after the big wound was covered with healthy granulations, a secondary resection was done.

Where the infection of the bone had become chronic, we were guided by the rules for the treatment of chronic osteomyelitis. Although the infections were severe and the comminution of bone great, pseudarthrosis was not so frequent as one would expect under the circumstances. Unfortunately I had no chance of any osteoplastic work, as none of the wounds was far enough advanced in healing that such a procedure could be undertaken without risk.

It is only natural that in the numerous wounds of the upper and lower extremities there is found a good number of injuries to the nerves and blood vessels. Among our cases were three traumatic aneurisms, as I have stated, but only one aneurism of the femoral artery was operated upon. The general rule for operating is to wait about six to eight weeks, until one can be sure of a fairly good collateral circulation, because in the majority of cases a vascular suture or a reconstructive aneurysmorrhaphy cannot be done, because usually the whole vessel is destroyed. In our case the femoral artery was completely shot through, and the aneurismal sac was of the size of two fists. It extended from the adductor foramen upward for about 18 to 20 cm. The artery was exposed above and below the aneurismal sac, and a small rubber tube tied lightly around it to injure against hemorrhage. This act of the operation was a little difficult near the adductor foramen, as the tissues were markedly indurated by the scar. The sac was then extirpated, which was rather difficult because it extended between the muscles. There was quite some vigorous retrograde arterial spurting from the distal end of the artery, thus demonstrating with certainty a good collateral circulation. Therefore, both ends of the femoral were tied. There was a diastasis between the two ends of nearly 9 cm., which precluded any attempt of suture. The wound was closed by suture and a few small rubber tissue drains inserted. Suppuration, however, occurred and a part of the wound had to be opened. It healed after four weeks.

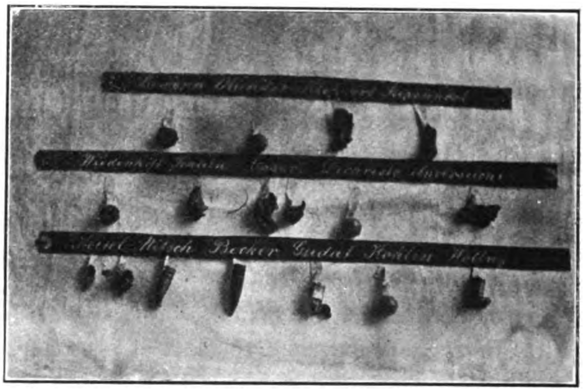

Fig. 6. Rifle bullets, shrapnel and shell fragments.

Injuries of the nerves.—Fourteen cases of paralysis of arm and leg were observed following injuries of the median, ulnar, radial and peroneal nerves.

As my experiences with these injuries will be treated in a special communication, I shall only allude to them here. In six cases the continuity of the nerves was re-established by nerve suture. In one case a neurolysis after Stoffel and in another case a tendon transplantation were done.

I wish to thank here the members of the expedition for their faithful and untiring efforts in helping to carry our work to a successful conclusion.

SOME SURGICAL CONSIDERATIONS CONCERNING THE OPERATION FOR GOITER.

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A record of 47 goiter cases appears very small when compared with the thousands reported by our western clinics and with Kocher's statistics of 30,000 cases.

However, a review of our experiences with this limited number of patients and the lessons learned thereby, may prove stimulating and productive of some good.

The most important question which presented itself was whether all thyroid enlargements or goiters should be removed surgically. In view of the small percentage benefited by internal medication, sera, glandular therapy, electricity, *x*-rays, etc., it is my opinion that surgical intervention is the most rational procedure.

While it is true that the prolonged use of certain therapeutic measures may be followed by a reduction in the size of the goiter or even by a temporary disappearance, a recurrence, which is frequent, will greatly aggravate the previous condition and give rise to all the clinical symptoms of goiter.

When we consider that diseases of the thyroid are on the increase in this country, and the claim of authorities that there is an increase in the number of cases of thyrotoxicosis, is it not reasonable to suppose that an innocent enlargement of the thyroid may be a potential factor in the production of Graves' disease? It is also a serious question whether we can restore the vascular and endocardial or myocardial integrity, even after operation, once the damage has been done by allowing hyperthyroidism to be established.

In my series of cases I have always urged operation in benign enlargement of the thyroid and those patients who refused consent at that time subsequently presented themselves with Basedow's disease.

One patient, a female, with a simple goiter of seven years standing, rapidly developed the vascular and nervous sequences of Basedow's disease after the birth of her second child and had the gland removed seven weeks post-partum. A similar condition also occurred in a male, age 36, who, after a business embarrassment showed fulminating symptoms which increased so rapidly that three weeks from the onset, operation was performed. I recently saw a case of goiter in a youth, which developed within two weeks after a fright, upon being summoned from college by the illness of his mother, and fiding her dead on his arrival. He was 22 years of age, neurotic, but physically powerful. The course of the disease in this case ran about four weeks and ended in death without a chance for operation. There were some signs of Addison's disease present, such as bronzing and cachexia.

I feel that lesions of the thyroid should be treated by removal of the diseased structure; it is a surgical entity and merits the serious consideration of the physician just as much as any surgical lesion. I except, of course, enlargements occurring in adolescent girls who should be kept under observation.

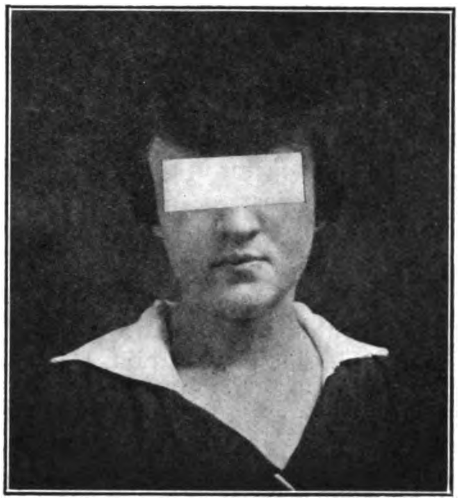

Fig. 1. After thyroidectomy, showing line of incision and cosmetic result.

The severity of the subjective symptoms are usually in accordance with the degree of annoyance caused by the lesion; thus the tracheal tugging may be felt as a slight sense of weight in the neck or as a constriction about the larynx. This relative degree of embarrassment is due to the amount of fibrous tissue binding the thyroid to the larynx and trachea. At times this is extreme and during the operation requires careful and prolonged dissection in order to free the gland from these structures The presence of the growth upon the contiguous structures is augmented in pregnancy, menstrual crises and the emotional incidents occurring in the life of many of the patients.

Women often desire the removal of the gland for cosmetic reasons.

The operation for the relief of goiter calls for the following important considerations, the observance of which has largely contributed to the success attained in the modern operation for thyroidectomy:

First: The collar incision should be of sufficient length to permit a free dissection, the ample space giving the surgeon better exposure and making the procedure safer.

Second: The choice of alert assistants, for rapid hemostasis is essential. This together with speed saves the patient from unnecessarily long anesthesia, too much handling and shock.

Third: After separating the fibers of the sternothyroid muscle keep close to the gland throughout the separation. If necessary, the sterno-cleido mastoid muscle may be cut across to give better exposure to the parts, the ends being sutured after the gland is removed. Care should be exercised to avoid the spinal accessory nerve.

Fourth: Careful dissection of the posterior and lateral borders in order to avoid injury to the carotid sheath or the inferior laryngeal nerves.

Fifth: Be sure to expose, freely, the upper pole of the gland so that a safe ligation may be performed with a generous pedicle. If necessary, cut the transverse layer of the deep cervical fascia. This is an important factor in reaching the superior thyroid artery and veins.

It is necessary to leave a small portion of the gland behind and also to avoid injury to the parathyroids in the dissection. The body being already over-saturated with thyroid secretion, it is advisable, in order to avoid additional strain, to handle the glands as little as possible. Vessels should not be ligated until the dissection is completed. If the temperature rises to a considerable height within twenty-four hours and the pulse is accelerated to over 120, with a suffusion of the face and eyes, I administer hypodermatically atropine sulphate, gr. 1/80, every two hours until reaction occurs.

In eight cases of thyroid poisoning, at operation, I intended to ligate the superior and inferior vessels but found that the ether anesthesia had such a pronounced tonic influence on the heart and vascular system, that thyroidectomy was done without the ligation.

I use Porter's boiling water injections, combined with rest and a bland diet, in extreme cases of Basedow's disease, before doing a thyroidectomy.

465 HIGH STREET.

GEORGE BEN JOHNSTON, M.D., LL.D., F.A.C.S.

In the death last month, at the age of 63, of George Ben Johnston, of Richmond, emeritus professor of surgery in the Medical College of Virginia, the South has lost one of its eminent surgeons and teachers. He had a large and active practice and, like the McGuires, had done very much to make Richmond the medical, and especially the surgical, center of a very large district.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, JANUARY, 1917.

FIRST AID TO THE INJURED.

Accidents are important and often peculiar because they occur under circumstances in which confusion and unpreparedness exist. Rapid transportation, the power of machinery, intensive application, fatigue, and the high pressure under which modern industry is carried on are capable of producing many accidents. Human disasters are suffered largely because the intensive machine work of the present day is conducted, not for the specific purpose that gives it its human value, but for the purpose of creating profits for those who own the tools and properties of production and transportation; and the interests of property and profits are permitted to take precedence over the interests of human life.

The prophylaxis of accidents will be most largely served when things are done because society needs them to be done, and not because small privileged groups in society are given opportunities to make profits. When the railroads and steamboats are run for the purpose of carrying passengers and commodities safely and expeditiously from one point to another, and not for the purpose of making dividends and interest—two utterly different and antagonistic motives—accidents will be diminished. When mills are run to produce food, clothing, and other human necessities for all of the people instead of profits for the few owners, the most important step in the prophylaxis of accidents will have been taken, and the longest steps toward the abolition of war, the great cataclysmic social atrocity, will have been made.

In the United States 75,000 people are killed yearly by accidents. Of these deaths, 50,000 occur in the competitive, profit-making, industrial struggle. Among workers in our industries, 36,000 are killed annually by accidents while at work. In the United States, in every 100 deaths among working males over fourteen years of age, over 9 per cent. are due to accidents. Nearly 4,000 workers are killed in the mines of the United States; and on the railroads 3,000 railroad employees are killed yearly, and 60,000 seriously injured. The railroads of the United States injure 170,000 and kill 12,000 people each year. In this country 2,000,000 children, who should be at play or at school, are working in the industries; and among them accidents are more than twice as common among adults in the same industries. The children are too young to take care of themselves. These accidents and deaths are but a trifle compared with the human injuries which arise indirectly from the same causes, and are seen associated with the crowded tenements, squalor, ignorance, and all the debauchery which the unequal competitive industrial struggle engenders.

Surgeons, who must deal with human suffering, should be something more than smug approvers of the *status quo*. In his eagerness to display the evidences of prosperity, the surgeon should not fall into the slovenly habit of necessarily approving of the things of which the rich approve and by virtue of which they retain their riches. He at least should apply the test of scientific inquiry and of social justice. There is abundant information upon these subjects accessible to all who are not afraid to possess themselves of it.[1]

No discussion of accidents is complete unless it calls attention to the industrial atrocities, for the most important consideration as an adjunct to treatment is the consideration of prevention. The statement oft made by the agents of great corporations, that "accidents occurring to employees and passengers result, for the most part, from carelessness or neglect on the part of the individual injured or of some employee responsible for the safety of others" (Keen's Surgery, Vol. V, p. 915), is either a purposeful equivocation or a misinterpretation of facts.

Surgery at least should be honest in dealing with the injured, and put the responsibility where it belongs. If it is the duty of surgery to bind up the wounds, it is also its duty to raise its voice against the greed for profits that causes the wounds. If it is the business of surgery to demand better equipment and organization to take care of the human wreckage of our industrial warfare, the result of which care is to make it more possible for employers to continue the exploitation of workers; so also is it the business of surgery to demand a social readjustment in the interest of the abolition of the privileges which make possible this same exploitation of human beings. Science and art are not worth keeping alive if they presume aloofness from the great fundamentals of human justice.—JAMES PETER WARBASSE.

FRACTURE OF THE NECK OF THE FEMUR IN OLD PEOPLE.

Fracture of the neck of the femur is probably the most common serious accident in the aged. The management of this fracture by Buck's extension, commonly employed until about fifteen years ago, and still too often used thus, is usually most unsatisfactory and should be abandoned altogether. One should consider only the following three plans: Whitman's reduction and immobilization; open operation (nailing or bone dowelling); no treatment. In the aged, open operation is hardly to be considered, and the surgeon has to decide according to the patient's condition whether he will reduce and immobilize the fracture in plaster, or get the patient about as best he can without attempting to secure union. In the very senile he will adopt the latter course; in less "aged" individuals the indication may not be so easy to decide. The average person of seventy is on the borderline where the surgeon should judge by the degree of his senility rather than by his years, whether he will bear the Whitman reduction under anesthesia and prolonged immobilization, or whether he should be denied this opportunity for an anatomical cure. Medically we must consider as "aged" those who are very old in their tissues and functions, no matter how old they be in years.

Fracture of the neck of the femur, always a very serious injury, is, in the aged, very often fatal—either early, by fat embolism or, much more commonly, by gradual debilitation and pulmonary hypostasis. With the breaking off of this span of bone often breaks off the span of life. Via the pubic arch most of us enter the world via the femoral arch many of us leave it.—W. M. B.

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[1] See: Public Health Bulletin No. 76, March, 1916, published by the Treasury Department, U. S. Public Health Services; Bulletin No. 30, Report on National Vitality, by Prof. Irving Fisher, for the National Conservation Commission; The Child Labor Bulletin, 1914, 1915, 1916, and 1917; Report of the United States Commission on Industrial Relations, 1915; Reports of the United States Children's Bureau, 1915, 1916 and 1917; Reports of the United States Department of Labor, 1910 to 1917; J. P. Warbasse, "The Socialization of Medicine," Jour. Am. Med. Assoc., 1913; Scott Nearing, "Income" and "Anthracite."

FORTHCOMING ISSUES OF THE JOURNAL

The March, 1917, number of the Journal will be devoted to surgery of the eye, ear, nose, throat, and bronchi.

In the February and April issues will appear, among others, the following articles:

The Recurrence of Gall Stones, by John B. Deaver, Philadelphia;

A Method of Opening a Parotid Abscess without Injury to the Facial Nerve, by Howard Lilienthal, New York;

A New Procedure for Suspension of the Pelvic Colon, by J. H. Kellogg, Battle Creek;

The Plastic Closure of Gunshot and Shrapnel Defects of the Inferior Maxilla, by J. F. S. Esser, Holland;

Clinical Observations on the Treatment of Prostatic Obstruction, by Henry G. Bugbee, New York;

The Suction Apparatus in Surgical Operations, by Walter M. Brickner, New York;

The Biopsy: How the Surgeon May Contribute to Its Diagnostic Value, by B. G. R. Williams, Paris, Ill.;

The Treatment of Colles' Fracture Considered from the Standpoint of Muscle Physiology, by Alfred J. Brown, New York;

With the April issue will also appear the quarterly Anesthesia Supplement.

Surgical Suggestions

Acute osteomyelitis of the fibula is comparatively rare. It is best treated, especially in children, by periosteal resection of the affected bone. Care must be exercised to avoid injury to the peroneal nerve and its branches.

Before performing a prostatectomy it is wise to determine roentgenographically that there is no stone in kidney or ureter.

An operation, even a radical one, for strangulated hernia is usually well borne by the senile, under local anesthesia. Cocaine should be avoided, however, if possible.

Never curette the uterus post-partum. The placenta should be expelled or removed at the time of labor. Small, retained pieces of placenta or membranes do no harm if introduction of outside bacteria is avoided.

Book Reviews

Diagnosis and Treatment of Surgical Diseases of the Spinal Cord and Its Membranes. By Charles A. Elsberg, M.D., F.A.C.S., Professor of Clinical Surgery at the New York University and Bellevue Hospital Medical College; Attending Surgeon to Mount Sinai Hospital and to the New York Neurological Institute. Octavo; 330 pages; 158 illustrations, three of them in colors. Philadelphia & London: W. B. Saunders Company, 1916.

Elsberg is one of the few who have achieved eminence in that highly specialized and difficult branch of medicine, the surgery of the central nervous system. To the pathology and the surgery of spinal cord lesions, especially, he has contributed much. This admirable volume comes to us with the impress of authority and unusual experience.

It is an altogether practical work, and the author has made it so not only by its wealth of beautiful, original half-tone illustrations by Josef Lenhard, but also by avoiding prolixity and confusing detail.

If the work teaches anything—and we think it teaches many things—it is that the neurologic surgeon should be able himself to diagnose and to localize organic lesions of the brain and cord (and, we might add, to distinguish functional disturbances from them). The surgeon who is dependent wholly upon the neurologist for his indications, general and topographic, is distinctly at a disadvantage.

Elsberg divides his subject into three parts. Part I deals with the anatomy of the vertebral column, of the spinal cord and its membranes; the physiology of the spinal cord (briefly); the localization of functions in the various segments; the symptomatology of cord lesions at various levels; differential diagnosis; roentgenography of the spinal column (with many excellent pictures, of which one—on page 79—is inverted); and a comprehensive and methodical plan of examination of the patient.

Part II is devoted to the technic of operations upon the spine, the cord and the nerve roots. In it Elsberg describes and illustrates his technic of laminectomy, division of the posterior roots (including indications, rationale, and methods), division of the antero-lateral tracts for pain (Spiller and Martin), the technic of aspiration and incision of the cord, and lumbar puncture. The difficulties and dangers, as well as methods and after-treatment of spinal operations, are considered. Elsberg does not advocate osteoplastic or hemi-laminectomy and the functional and anatomical results and free exposure of bilateral laminectomy, rapidly performed, support his choice. In a few pages the author presents the indications and contraindications that govern the consideration of a laminectomy. He also calls attention again to the fact that simple exploratory exposure of the spinal cord, even in the absence of increased tension, often relieves a great variety of symptoms.

Part III describes the surgery of the following conditions: spina bifida and spina bifida occulta; abnormalities and diseases of the spinal bloodvessels; fractures and dislocations affecting the cord or nerve roots, and bullet and stab wounds of the cord; tumors of the vertebrae, the cord and its membranes (with a description of the two-stage "extrusion" method of operating for intramedullary growths evolved by Elsberg and Beer); hematomyelia, syringomyelia, gliosis, and cord abscess; inflammatory diseases of the cord, nerve roots, and membranes, including "neuritis of the cauda equina" as recently described by Elsberg and Kennedy; cord complications of Potts' disease, and inflammatory diseases of the vertebrae.

In his description of spina bifida occulta Elsberg says that it is a variety of spina bifida "in which there is no true sac and in which there is a fibrous connection between the skin and the spinal cord, or its nerves or its membranes, through a cleft in the arch of one of the vertebrae." In spina bifida occulta there is often a true sac, indeed a distinct hernia of nerve roots and meninges, and there is also often a congenital lipoma separating these from the skin, as Elsberg mentions on another page. He attributes the appearance of symptoms during adolescence to traction upon the membranes or the nerve roots and cord by the lengthening of the spinal column and the relative shortening of the cord; this is but a part of the explanation, for it omits from consideration the teratoma that is often found in the canal and the degenerative processes that are independent of traction.

With the exception of a few uncorrected printer's errors this book is typographically and pictorially as attractive as it is textually excellent. It is therefore all the more to be regretted that the author was not more careful in grammatical construction and phraseology.

Geriatrics. The Diseases of Old Age and Their Treatment. Including Physiological Old Age, Home and Institutional Care, and Medico-Legal Relations. By I. L. Nascher, M.D., Chief of Clinic, Internal Medicine, Mount Sinai Hospital Dispensary, New York; formerly Special Lecturer on Geriatrics, Fordham University School of Medicine. With an Introduction by I. Jacobi, M.D. *Second Edition.* Large octavo; 527 pages; 50 plates (81 illustrations). Philadelphia: P. Blakiston's Son & Co., 1916.

Geriatrics, the term invented by Nascher and now generally adopted, applies to an important phase of medicine that has had but comparatively little special consideration. The literature of senile affections and the physiology and pathology of senility is comparatively small. This work is unique; it is the only modern comprehensive book on the subject in our language.

In this, the second edition, the author has brought his work up to date and has added a well-considered chapter on "Surgical Procedure in Senile Cases," in which the dangers of major surgery on the aged are discussed and the treatment of some of the commoner surgical conditions that may arise in the senile is considered.

The illustrations in the work are all borrowed; original photographs would have added to its value and attractiveness. The typographic arrangement could also be improved.

From the therapeutic side the reader cannot fail to learn a good deal from reference to this work. The discursive portions on the physiology of old age, on pathological states and degenerative processes, and on the miscellaneous topics grouped under the heading of Hygiene and Medico-Legal Relations will likewise be found suggestive and interesting.

The Treatment of Diabetes Mellitus. With observations upon the disease based upon 1,000 cases. By Elliot P. Joslin, M.D., Assistant Professor of Medicine, Harvard Medical School; Consulting Physician, Boston City Hospital, etc. Octavo; 440 pages; illustrated. Philadelphia and New York: Lea and Febiger, 1916.

The studies in diabetes during the past five years, especially by Allen, have almost completely reversed our understanding and treatment of this disease. For these benefits, which the practitioner has proven by his better results, we feel profoundly grateful. It is therefore with especial interest that we welcome this book, written by a master, who has contributed much to our understanding of the subject.

The title belies its content, as the subjects of the chapters indicate. These are: 1. Statistical studies upon the course and treatment of diabetes mellitus. 2. Important factors in the treatment of diabetes. 3. Examination of the urine, blood and respiration. 4. The diet in health and diabetes. 5. Treatment. 6. Aids in the practical management of diabetic cases.

The text is the result of a fine combination of broad experience and intensive study, clinical, experimental and chemical. It is refreshing to find such clean-cut statements. The style is easy and didactic. References to the literature are abundant, although the text is not burdened by proper names. Numerous case reports illuminate the text. Numerous charts, tables, etc., also constitute much to the value of the work. To our mind, it is the most valuable and authoritative book on the subject extant.

Progress in Surgery

A Résumé of Recent Literature.

Perineal Anesthesia in Labor. Robert W. King, *Surgery, Gynecology and Obstetrics*, November, 1916.

According to King, it is possible to anesthesize the perineum by nerve blocking so that the pains of labor may not be felt for a period varying between two and four hours. The perineum is divided into two triangles, an anterior and a posterior, by drawing a line between the tuberosities of the ischium in front of the anus. In the anterior triangle the needle is entered at a point 2 to 4 centimeters above the lower margin of the vagina and 2 centimeters from the rami. It is then passed 2 to 4 centimeters in depth where it may meet the resistance of Colles' fascia, which is a tender point and causes the patient to express pain. The Colles fascia is penetrated and the solution, 2 per cent. novocain, injected. About 1½ ccm. is used on either side. In the posterior triangle the needle is entered at a point midway between the anus and tuberosities to a depth of 4 centimeters. From 5 to 10 c.c.m. of a 1 per cent. solution of novocain are injected in the posterior triangle on either side. Anesthesia follows a few minutes after the injection and lasts from 2 to 4 hours. It should be used for the second (perineal) stage of labor.

Ectopia Testis Transversa with Infantile Uterus. Arthur E. Hertzler, *Surgery, Gynecology and Obstetrics*, November, 1916.

The very rare condition of two testes in one sac, described in the term invented by Lenbrossak "ectopia testis transversa," is made still rarer by the association in the same serotal sac of an infantile uterus. In structure the uterus was complete but under-developed. There is one other similar anomaly recorded in the literature, that reported by Cornil and Brossard.

A Contribution to the Etiologic Study of Ovaritis. Carl Henry Davis, *Surgery, Gynecology and Obstetrics*, November, 1915.

From a cultural study of 62 ovaries showing the changes found in fibrocystic degenerations and 3 in which the process was more acute, the finding of the streptococcus viridaus in 50 per cent. of the cultures suggests that the streptococcus viridaus is the most common organism associated with chronic ovaritis. The gonococcus was found in a very small percentage of the cultures, indicating that this organism may not be responsible for as many infections of the ovary as has been formerly supposed. In a number of the cases there was no definite history of gonorrhea or puerperal sepsis, especially in young women. But there was in these cases a definite history of angina developing during menstruation, of pelvic symptoms following a tonsillitis. Further, the organism recovered by culture from the ovary reproduced, on inoculation, ovaritis in animals. All these facts point to the hematogenous origin of chronic ovaritis not traceable to gonorrhea or puerperal infection.

In 15 of 18 degenerated ovaries associated with fibroids of the uterus (eleven showed streptococcus viridaus), bacteria were found suggesting strongly that bacteria are likewise responsible for the chronic ovaries so commonly associated wih fibromyomata.

The Leucocytes in Pregnancy, Labor and the Puerperium. Joseph L. Baer. *Surgery, Gynecology and Obstetrics*, November, 1916.

There is, according to Baer, a lencocytosis of pregnancy which appears in the ninth month, slight in amount and especially noticeable in primiparae. In labor the lencocytosis is marked in primiparae, averaging 18, 255, and is increased by a duration of labor beyond twenty-four hours. It is less marked in II parae and is slight in III plus parae. The height of the curve in primiparae and multiparae is reached on the first day of the puerperium, after which there is a rapid and constant decline to the tenth day, at which time the curve is about at the normal level. The onset of lactation does not influence the lencocyte count, except that in the "fourth day" primiparae there is a slight secondary elevation on the preceding day—about 1,500 to 2,000. Age is not a factor, except in primiparae aged 20 years and under, in whom the lencocytosis is higher than in any other group.

The Bastedo Sign in Chronic Appendicitis. Jacob Rosenbloom. *Surgery, Gynecology and Obstetrics,* November, 1916.

Bastedo described a method in 1909 and 1911 of eliciting tenderness over McBurney's point by distention of the colon by means of an atomizer bulb. The colon tube is passed eleven to twelve inches into the rectum and on distension with air pain and tenderness become apparent at that point in the presence of chronic appendictis. Rosenbloom presents 40 cases of intra-abdominal lesions with operative findings in which this test was applied. Practically in every case of chronic appendictis the Bastedo Sign was present. In the other conditions it was negative.

The Etiology and Pathology of Non-Tuberculous Renal Infections. Hugh Cabot and E. Granville Crabtree. *Surgery, Gynecology and Obstetrics,* November, 1916.

That there is no lesion of the kidney typical of an ascending infection is the contention of these authors. Two cases in their experience have convinced them of this fact, as the lesions illustrated in the paper are identical, whether the infection is of the ascending variety or hematogenous. The urine contains the infective organisms very early in the disease, though not for long. The two types of infection are: (1) Suppurative infection involving chiefly the cortex and compartively little the convoluted tubules. In this variety the function as determined by phthalein is very little affected. (2) The chief lesion of acute renal infections with the colon bacillus group is first in the convoluted tubule, the pelvic lesion, though appearing early, being, they think, secondary to the tubular lesion. In this variety there are profound changes in the kidney function as determined by the phthalein excretion. According to Crabtree, it is possible to differentiate between these two types of renal infection.

If with clinical evidence suggesting a renal infection, freshly drawn urine shows cocci in abundance with a small amount of albumin, a few red blood corpuscles and many lencocytes or a little pus, together with a renal function at or near normal limits, a diagnosis of coccus infection of the kidney is justified. If, on the other hand, a similar examination shows many bacilli, a little albumin and much pus coupled with a markedly diminished kidney function, a diagnosis of coon bacillus infection of the kidney is unavoidable.

The Treatment of Papilloma of the Bladder by the High-Frequency Current. J. W. Thompson Walker, *The British Journal of Surgery,* October, 1916.

Walker analyzes his results with Beer's method of "high-frequency" treatment in thirty-three cases of papilloma of the bladder. In 14 cases the growth was completely destroyed in one sitting; the patients were allowed to get up promptly, or after one day's rest. This procedure is in marked contrast to the circumstances which attend an open operation for a similar condition. In but very few of the cases two or more sittings were required for removal of the growth. Where necessary, the treatment should be persisted in, until all traces of the growth have disappeared.

Walker points out that Beer's procedure is not applicable to some types of multiple coalescing papillomatous growths, infected growths, growths in the immediate vicinity of the urethral orifice, and finally malignant neoplasms.

Wounds of the Thoracic Duct. Edward Harrison. *The British Journal of Surgery,* October, 1916.

After a preliminary review of the works of several authors who have written on this subject, Harrison discusses in greater detail the four most available methods of treatment advocated, and he places them in the order of their relative importance.

1. *Suture.* Where this can be accomplished, suturing the wound of the duct is by far the most preferable procedure.
2. *Implantation into a vein.* This should be, by all means, accomplished if the duct is single. Obviously this entails a great deal of technical skill, but the result, if successful, is well worth all efforts.
3. *Ligation of the duct.* Since Parsons and Sargent have shown that in 18 out of 40 cases the duct has two terminal branches, it may be expected that ligation of the thoracic duct may be successful in nearly half the cases met with. The surgeon should therefore look for a second terminal branch, and if found, ligation should be carried out.
4. *Tamponade.* This last procedure should be the last resort. The hope here lies in the possibility of establishment of collateral circulation.

A Plea for the Electro-cautery in the Treatment of Laryngeal Tuberculosis. By Samuel Iglauer, *The Laryngoscope,* October, 1916.

After stating the gloomy outlook in the treatment of laryngeal tuberculosis by the generally employed methods of sprays, inhalations, local applications, etc., Iglauer gives the rather favorable statistics of the cautery method as employed by various clinicians.

Experimentally, Albrecht inocculated the larynges of rabbits with human tuberculosis. He cauterized the resulting lesions with the galvano-cautery and killed the rabbits at varying intervals. A local destruction of tissue took place from the cauterization. Remotely there was an inflammatory reaction and a fibrosis which tended to limit the tubercular process.

Iglauer does not recommend this treatment for patients who have active pulmonary lesions with high temperatures.

He operates with the suspension laryngoscope under cocain and scopolamin-morphin-anesthesia. Post-operative treatment consists of ice applications to the neck, ice pills and orthoform insufflation. Dangerous edema is rare.

Felons. George M. Dorrance. *Annals of Surgery,* December, 1916.

Dorrance has made a careful anatomical and pathological study of felons, and has reached the conclusion that the usual method of treating a felon is faulty and entirely contrary to the underlying pathology of the condition.

His method is to promptly (the earlier the better) incise the finger. The incision starts at the base of the nail on one side and extends along the line of the furrow over to the tip of the finger, down on the other side to a point on a level with the beginning of the incision, in this way making a flap of the finger tip. A drain is kept in place for three days and then removed permanently. The parts are kept wet with normal saline solution.

Practically all felons treated in this way give a perfect result.

Massive Hemorrhages of the Stomach Without Demonstrable Ulcer. A. V. Moschcowitz, New York. *American Journal of the Medical Sciences,* November, 1916.

Moschcowitz reports four cases. In all the only symptom was massive hemorrhages from the stomach, frequently repeated. There was no previous history of gastric disturbance. Following these hemorrhages there was a profound anemia. At operation no demonstrable lesion was found, although for obvious reasons the stomach was not opened. A gastro-enterostomy, sometimes with pyloric occlusion, was done, and all patients recovered completely. In some instances the operation was not followed by prompt cessation of the hemorrhage. Moschcowitz believes his cases correspond to those originally described by Dieulefoy. The latter describes in these cases a small "exulceration" extending into the submucosa; at the base of this small ulcer is a bloodvessel of considerable size. Up to the present only a comparatively small number of such cases has been reported.

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THE HANDLING OF HAZARDOUS GENITO-URINARY RISKS FOR OPERATIONS UNDER ANESTHESIA.*

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In the consideration of any questions on anesthesia, the anesthetist should not confine himself to the actual administration of the anesthetic itself. It should be his aim to have his patients leave the hospital well and he should take such measures before, during and after the operation as will insure the recovery of the patient. He should not feel that his task begins and ends on the operating table. He should be as keen to effect the ultimate recovery of the patient as the surgeon. It is in this spirit that I approach the subject of the handling of hazardous genito-urinary risks. You will pardon me, therefore, if I have so little to say about the actual administration of the anesthetic itself.

In no branch of surgery does the successful outcome of an operation depend so largely upon the proper handling of the anesthesia as in genito-urinary work, as all cases are either actually or potentially hazardous risks. Those cases not considered hazardous before the operation may quickly become so.

The proper handling of these cases may best be considered under three headings, (1) the preparation, (2) the actual administration of the anesthetic itself, and (3) the after-treatment.

THE PREPARATION OF THE PATIENT

In other branches of surgery, I believe the quicker the ordeal is over and the less the preparation, the better, but not so in this class of cases. Barring strictly emergency conditions no patient should be operated upon without making a careful functional test, preferably the phenosulphonethalein. If the test is low, and many of our cases tested as low as 1 per cent. during the first hour, rest in bed, increasing the fluid intake by giving vichy or any other alkaline water, and careful attention to the diet may improve conditions. That measure, however, to which we have pinned our faith and which has proven most efficacious in our hands in increasing the output, steadying it and improving the patient's general condition, has been the thorough alkalinization of the patient. The urine should be persistently alkaline to methyl-red. Of course an alkaline urine due to ammoniacal decomposition is to be guarded against. They are given alkalies by mouth or, if necessary, by rectum or even intravenously. These patients get not one drop of water that is not alkaline. It is remarkable how under this treatment, the urinary output increases and how cases, otherwise hopelessly unfit for operation, are successfully operated upon. Whatever difference of opinion there may be as to the treatment of an established nephritis by Fischer's methods, there is no question, in my mind, that as a prophylactic in genito-urinary surgery it stands alone and its value is incalculable. In 1903 Sollman, in the American Journal of Physiology, Vol. 9, 461, said: "In the light of these experiments, the superior diuretic action of hyperisotonic solutions is explained by their causing a shrinkage of the cells, and through this, increasing the lumen of the blood-vessels, and hence the rapidity of the circulation." So, therefore, despite the fact that sensory stimuli arising in the urinary tract do cause a vasoconstriction of the kidney vessels we shall have anticipated and overcome this very serious complication.

If the patient's bowels move regularly every day they will need no attention. If they do not, any of the saline cathartics may be used to insure daily evacuations. Drastic purgation is decidedly harmful. No cathartic should be given the night before the operation, but the bowels should be emptied the morning of the operation by an enema. I think it is bad practice to give a cathartic the night before any operation, as it simply tends to make the bowels uneasy following the operation and to cause many of the *gas pains*. It must not be forgotten that cathartics interfere not only with the normal interchange of fluids between the circulation and the bowel; but that the absorption of gases is also interfered with.

The blood pressure should be closely observed and every effort should be made to bring about as normal a condition as possible.

It is evident from the above that no definite time can be set for the operation. We do not hesitate even after the time is definitely determined upon to postpone the operation at the last minute, if, in our judgment, the patient is not in as good a condition as we believe it is possible to get him.

On the morning of the operation the patient is allowed to drink as much vichy water as he may desire up to within a half hour of the time set for operation. About an hour before the operation we usually give a quarter of a grain of morphin and 1/150 of atrophin or the patient is given two hypodermics of an 1/8th of a grain each at an interval of a half hour. I personally prefer giving the two doses. We have tried as a preliminary narcotic codein, by rectum and hypodermically, heroin and pantopon, but have always returned to morphin.

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*Read during the Second Annual Meeting of the Interstate Association of Anesthetists, Louisville, Ky., July 26-27, 1916.

THE ANESTHETIC ITSELF.

Local anesthesia is to be used, of course, where-ever it can be used to advantage. I do not believe that it should be used in any case where it would materially lengthen the time of operation or interfere to any extent with the various manipulations necessary in the performance of the operation. Its field is very limited.

When it comes to the question of a general anesthesia, there is but one anesthetic that should ever be considered, and that is nitrous-oxid oxygen.

Spinal anesthesia has deservedly fallen into disrepute wherever nitrous-oxid oxygen is available.

THE AFTER-TREATMENT.

The after-treatment consists again in the pushing of the alkaline waters. As soon as the patient is conscious, which occurs almost immediately after a nitrous-oxid anesthesia, the patient is allowed to have vichy water. Rarely, if ever, is there nausea following a nitrous-oxid oxygen anesthesia and consequently the intake of alkaline waters can be pushed from the start. Fischer's solution is given immediately per rectum by the drop method and is continued as long as it causes the patient no discomfort, but is started again as soon as possible.

Pituritin hypodermically and Fischer's solution intravenously are our mainstays should there be the slightest evidence of impending shock or scanty urinary secretion following the operation.

Suprapubic prostatectomies in old men are hazardous enough, I believe, to suit the most critical. Up to the time of writing this paper, of 43 consecutive suprapubic prostatectomies, in which the patients had been prepared as outlined above, all left the hospital well excepting three. One died on the second day from acute peritonitis. One died on the 14th day from acute mania. This case was an exceedingly bad risk and showed some mental symptoms before the operation. The third patient dropped over dead on the 15th day as he was stooping over to put on his slippers.

Our cases have been strikingly free from postoperative complications of all kinds. In only four cases out of the whole series was there any nausea or vomiting at all, which is an important factor, when one wishes to push the alkaline waters by mouth. In no case following the operation was there enough disturbance of the urinary secretion to cause us any alarm. There was absolutely no complication on the part of the respiratory tract in any case. Fifteen of these patients were over 70 years of age, one being 86, and he recovered, 18 were between 60 and 70 and the remaining 10 cases were below 60.

Dr. George F. McKim operated upon all of these cases and I wish to thank him and his associate Dr. A. E. Koch for valuable suggestions and the privilege of reporting these cases.

60 Groton Bldg.

SOME OBSERVATIONS ON THE RELATION OF BLOOD-PRESSURE TO ANESTHESIA.*

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Since the first administration of ether in 1846 and chloroform in 1847, the advantages and disadvantages of each have been tested in laboratories and clinics, in skilled and unskilled hands, and while the dangers during administration and after are greater with chloroform than with ether, still chloroform is used and used extensively, and that because of desirable qualities which it possesses.

The patient goes under quietly, anesthetic sleep is complete and conduct during the operation is ideal from a surgical point of view. If we could eliminate its toxic features and sudden deaths, chloroform comes nearer to being an ideal anesthetic than any other. In view of the fact that chloroform is still being used we must conclude that the ideal anesthetic has not been found.

Nitrous oxid and oxygen with its advantages and enthusiastic following is so cumbersome, expensive and difficult of administration, as well as dangerous in the hands of anyone who is not an expert, that it cannot come into general use until it can be handled with simple apparatus and rendered safe by proper and definite control.

In regard to safety it stands in about the same relation to ether that ether does to chloroform. The patient goes under quietly, recovery is pleasant and it is less toxic than other anesthetics, but the disadvantages spoken of together with lack of relaxation are not easily overlooked.

Since ether has not completely supplanted chloroform because of its greater safety to the patient, so nitrous oxid and oxygen will not supplant ether simply on its virtues until its disadvantages are overcome.

In the surgical clinic at St. Vincent's Hospital, Portland, Oregon, ether by the drop method is used in every case. Blood-pressure, pulse and respiration are taken and recorded on McKesson charts. Notations are also made of each stage of anesthesia and operation. During the three years in which we have used these records, we have found that blood-pressure furnishes accurate information as to the condition of the patient, and that shock may be anticipated and remedial measures instituted in its incipiency.

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*Read during the Fourth Annual Meeting of the American Association of Anesthetists, Detroit, June 12, 1916.

1. According to Fairlie: "Little alteration of blood-pressure is produced by ether. It may cause a rise, it may maintain a constant level, or it may cause a fall. It causes more rapid and forcible cardiac action, with dilatation of the smaller vessels (as evidenced by the flushing which occurs), the latter probably counteracting the former in maintaining the blood-pressure level almost constant. With intercurrent shock a considerable fall of pressure takes place."

We have found that in the initial stage of anesthesia, at least, there are fairly constant changes in arterial blood-pressure—a rise during the initial stage and a fall to normal when surgical anesthesia is reached. These may be due, however, to emotion and excitement rather than to the anesthetic.

When the patient is brought to the operating room there is a rise in blood-pressure varying with his condition and temperament. The rise takes place in patients who have had an administration of pantopon gr. 1/ or morphin sulphate gr. 1/6 and atropin gr. 1/150 as well as in those who have had no preanesthetic medication.

On the other hand, during the administration of ether there is a gradual drop in blood-pressure from the beginning to the end of the operation.

In consequence of the arrangement of valves in the veins, contraction of the skeletal muscles forces blood toward the heart. During ether anesthesia these muscles are relaxed as well as the visceral muscles and this important factor in the movement of the blood is eliminated.

2. The movement of the blood into the thorax during inspiration due to lessened intrathoracic pressure is aided by the rise in pressure in the abdomen caused by the descent of the diaphragm. When the peritoneum is open pressure in the abdominal cavity cannot be raised by the descent of the diaphragm and another important factor in the movement of the venous blood is interfered with.

These two factors may explain the gradual drop in blood-pressure from the beginning to the end of ether administration in abdominal operations.

Besides the gradual fall in blood-pressure there is a sharp drop when the incision through the skin, intervening layers and peritoneum is made. During manipulation of the bowels to locate an appendix, or exploration for lesions in doubtful cases where appendicitis, gastric ulcer, or cholycystitis is suspected there is a sharp fall of pressure. Manipulations of the gall bladder or operations on the gall bladder seriously disturb the circulatory equilibrium, causing an immediate and decided drop in every case.

In one case during an investigation of a supposedly pathological condition of the kidney blood-pressure fell 100 mm. and climbed steadily though slowly on completion of the examination.

Removal of the appendix, for instance, cutting or suturing incidental to same is without effect on blood-pressure conditions.

Since low blood-pressure is the essential phenomenon of surgical shock it follows that the anesthetic, trauma of the peritoneum or abdominal viscera, particularly those closely related to the diaphragm, are shock producing factors when prolonged and in the handicapped patient must be carefully adjusted to fit the limitations.

The theories in regard to shock are many.

3. Crile believes that shock is due to exhaustion of the Betz cells of the cerebrum and the Purkinje cells of the cerebellum excited by stimulation of the sensory nerve endings. The block takes place somewhere in the afferent pathway. "The afferent path from the seat of injury being unbroken, the afferent stimuli reach and modify the brain-cells as readily as if no anesthetic had been given, and it would seem that the brain-cell changes must be due to the discharge of energy in a futile effort to escape from injury."

4. Sherrington claims that fatigue occurs first in the central nervous system and that the block occurs in the afferent side of the reflex arc, but presumably in the synapses. The seat of both excitation and of inhibition is not in the actual motor neuron itself, but in the synapse of the intermediate neuron connected with it. Since the seat of excitation and inhibition is in the synapses, fatigue must in all probability be here also. "The seat of fatigue is intraspinal and central more than peripheral and cutaneous, and affects the afferent part of the arc inside the spinal cord probably at the first synapse."

5. Seelig and Joseph conclude that "a paralysis or failure of the vasomotor centre is not the primary cause of the other symptoms of surgical shock," because in their experiments, in which the vasoconstrictor nerves to one ear are cut, comparison of the calibre of the blood-vessels of the normal ear during induced shock to those of the denervated ear show constriction of the peripheral arteries and not dilatation. The action of adrenalin being pre-

vented by the removal of the adrenal glands previous to the experiments.

6. Corbett's suprarenal exhaustion theory is based on reduction of the epinephrin content of the suprarenal medulla in animals reduced to traumatic shock and the development of symptoms similar to shock in animals deprived of suprarenals. Shock was produced earlier in animals in which the suprarenals had been removed.

7. Porter has found that stimulation of an afferent nerve will produce a rise of blood-pressure when the animal is in a condition of surgical shock.

8. In vasomotor reflexes Bayliss found that by stimulation of the central end of the depressor nerve blood-pressure was reduced to about half its height and remained at this level without change for 17 minutes. When stimulation was stopped previous blood-pressure level was restored immediately, showing that the centre was not fatigued.

9. Janeway and Ewing obtained abdominal congestion and shock upon handling the intestines when the CO_2 content of the blood was, by special means, not appreciably reduced, and suggest that a local paralysis of the vessels and intestines occur which accounts for the stasis.

10. Henderson by his acapnia theory shows that excessive breathing during anesthesia diminishes the CO_2 content of the blood, thereby causing apnea which may prove fatal, or the elimination of CO_2 may progress to more acute acapnia with consequent circulatory failure. The deficiency of CO_2 affects the veins, capillaries and tissues causing an extravisation of fluids out of the bloodvessels into the tissues with consequent diminuition of its volume or oligemia. A reduction of CO_2 content of the blood causes a greater passage of CO_2 from the tissues. For every CO_2 ion passing, two Cl ions migrate to the tissue spaces and in this way increase the osmotic attraction for water and induce the oligemia.

The results obtained by Lyon suggest that the blood does not accumulate in the splanchnic area in shock.

In regard to Seelig and Joseph's experiments, the removal of the suprarenals is of little value, as other chromaffin tissues in the body may to a certain extent, at least, replace the adrenals and supply epinephrin to the blood.

Corbett's theory will not suffice as reflex secretion of epinephrin is not necessary as an accompaniment of pressar reflexes which require also excitation of the vasoconstrictor centre. The chief function of epinephrin, secreted by the suprarenals and paraganglia cells, is to produce in smooth muscle a state of excitability or receptivity and to cause the cells of the liver and muscles to set free sugar.

The bulk of evidence in the work done to determine the nature of surgical shock seems to indicate that failure of the vaso-motor centre does not occur. With this point clearly settled and ephinephrin exhaustion not applicable it remains to be determined through practical clinical tests whether a reduction of venous tonus due to local paralysis, produces stasis, or an oligemia as suggested by Henderson occurs.

Since blood-pressure readings furnish an index of the condition of the patient, the steps in the development and progression of shock may be followed with the greatest precision, but the treatment is not adequate to allay or prevent it in all cases, nor is preventative treatment effective in all cases.

As stated above, low blood-pressure is the most serious condition of shock, therefore, the immediate treatment must be directed toward its restoration and maintenance. Although the cause of shock has not been determined up to the present time, Crile's anoci-association treatment aims to prevent the conditions which produce low blood-pressure.

The patient is not allowed to spend a restless night preceding the operation. Fear and excitement are allayed by morphin and atropin half an hour to an hour before anesthesia. Local anesthesia is combined with general to block the afferent impulses. In this connection Dr. Weiner's recent report of brilliant results in a series of fifteen cases of appendectomy, under local anesthesia alone, is of interest.

When shock has developed efforts are made to prevent its progress, also to restore and maintain blood-pressure level at or near normal. Epinephrin in saline solution 1-50,000 or 1-100,000 intravenously. The saline restores the volume of circulating fluid and the epinephrin causes a constriction of the arterioles. The administration should be slow, as the rise is only temporary and the salt solution very quickly leaves the bloodvessels.

Strophanthin also given intravenously produces a slowing and strengthening of the heart and a prolonged rise of blood-pressure. Improvement takes place, however, half an hour after administration but continues for fifteen to twenty hours.

Camphor, unlike the other local irritants, such as alcohol and ether, produces no bad after effects and should be used for its immediate beneficial effect. As atropin is a slowly acting drug it should be given for its remote effect, if it has not already been given previous to the anesthetic.

The head should be lowered in all cases to prevent

anemia of the brain and artificial respiration resorted to when required.

Bibliography.

1. Fairlie, H. P.: Lancet, London, 1916. I No. 4722, pp. 587-658.
2. Keith: Journal of Anatomy and Physiology, Vol. 42, 1, 1908.
3. Crile: Anoci-Association, pp. 34-50, 1914.
4. Sherrington: The Integrative Action of the Nervous System, New York, 1906.
5. Seelig and Joseph: Journal of Laboratory and Clinical Medicine, pp. 283-299, 1916.
6. Corbett: Journal of the American Medical Association, pp. 380, 383, 1915.
7. Porter and Beyer: American Journal of Physiology, Vol. 4, 283, 1900.
8. Bayliss, W. M.: Journal of Physiology, London, Vol. 14, pp. 303, 325, 1893.
9. Janeway and Ewing: Annals of Surgery, Vol. 59, p. 158, 1914.
10. Henderson: American Journal of Physiology, Vol. 21, 128, 1908. American Journal of Physiology, Vol. 27, 152, 1910.

ANESTHESIA AND ANALGESIA IN THE CURRICULUM, THE CLINIC AND PRIVATE PRACTICE.*

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Mr. Chairman, Members of the National Dental Association, Members of the Interstate Association of Anesthetists, and Guests:

This is truly an auspicious occasion, and one teeming with great opportunities for the future. This is the first time in history that two important organizations representing the medical and dental professions have met on equal terms to discuss vital subjects of common interest. This is the moment to which leading thinkers of both professions have eagerly looked forward, and in this common meeting their ideals, so fondly cherished, are consummated.

It is particularly fitting that this reunion occur in the discussion of the subject of anesthesia. No greater gift has been given to humanity than the wonderful endowment of the loss of sensibility to pain. It seems hardly possible to younger men in the profession that the first general anesthetic, nitrous oxid, was administered only seventy-two years ago. In the days of our grandfathers, cracked ice, Indian hemp, opium and alcohol were the agents used to diminish the agony of the suffering. In these days of modern surgical procedures, by the aid of trained anesthetists and by the employment of anesthetics best suited to the case, operations can be performed which were not dreamed of seventy-five years ago.

As a coincidence of this common meeting, it is an interesting fact that dentists and physicians have shared equally in the discovery and early development of anesthesia. In Hartford, Connecticut, a tablet was erected on the wall of the building now occupying the site of the building in which Dr. Horace Wells's office was situated. The tablet bears the following inscription:

> ON THIS SPOT HORACE WELLS,
> DECEMBER 11, 1844, SUBMITTED
> TO A SURGICAL OPERATION,
> WHEREBY HE DISCOVERED, DEMONSTRATED AND PROCLAIMED
> THE INESTIMABLE BENEFITS OF
> ANESTHESIA.

There is also a monument in Hartford to Wells erected by the State of Connecticut and the City of Hartford. The citizens of Boston erected a marble monument to Morton in Mount Auburn Cemetery with the following inscription:

> WILLIAM THOMAS GREEN MORTON,
> INVENTOR AND REVEALOR OF ANAESTHETIC INHALATION, BEFORE WHOM IN
> ALL TIME SURGERY WAS AGONY, BY
> WHOM PAIN IN SURGERY WAS AVERTED
> AND ANNULLED, SINCE WHOM SCIENCE
> HAS CONTROL OF PAIN.

In the present day, members of both professions are equally prominent in the administration and research work connected with this great subject.

Reading from the constitution of the Interstate Association of Anesthetists, we learn that:

"The objects of this association shall be to advance the science and practice of anesthesia and analgesia; to promote the teaching thereof and to conserve the interests of anesthetists."

Its members are composed of licensed practitioners of medicine and dentistry, interested in anesthesia and analgesia.

It has been asked what advantages would the general practitioners of dentistry derive from being a member of this society.

It becomes the unwritten obligation of every individual entering a profession to strive to make that profession the better for his presence. The watchword of today is *service*. Men more clearly realize the truth of the old saying:

"What I kept, I lost;
What I spent, I had;
What I gave, I have."

One of the objects of this association is to establish the teaching of anesthesia and analgesia in the curricula of all medical and dental colleges. The great majority of graduates enter the practice of their profession with no thought of advancing the methods or educational requirements of their professional schools. They daily witness shortcomings in the education of future associates without even suggesting better plans or endorsing those men who are working for better conditions. The status of a profession is not in the ideals of that profession, but in the general average of its members. One of the greatest pieces of service which the individual dentist can render is to obtain membership in this organization and insist that the education of dental and medical students in anesthesia be improved. Until all professional schools are run for the benefit of humanity and not for private gain, supervision of them is not only necessary but should be considered by each individual as his professional obligation.

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*Read during the Joint-Session of the Interstate Association of Anesthetists and the National Dental Association at Louisville, Ky., July 26-27, 1916. Chairman's Address.

Another opportunity for the general practitioner to advance the standards of his profession is to ally himself with a body of men which is striving to guide the legislators in the various states to pass laws which will truly serve the medical and dental professions as well as the general public.

It is of great interest to dental anesthetists to know that the Quarterly Supplement of Anesthesia and Analgesia was able to prevent a reprehensible propaganda against the dentists of New York State when, during the 1915-16 session of the legislature, an effort was made to differentiate the respective prerogatives of dental and medical anesthetists as a side issue to abolishing the unlicensed anesthetist.

This propaganda was in direct contravention to the newer spirit of amalgamating the interests of the allied professions, which is leavening the American professions of medicine and dentistry.

The Interstate Association of Anesthetists at this meeting has endorsed and will co-operate with the activity of the American Association of Anesthetists, which consists in a canvass of all the medical and dental schools, clinics and hospitals, with a view of standardizing methods of instruction and training in anesthesia and analgesia. While a number of dental schools have organized departments of anesthesia under competent instructors, there is still considerable room for improvement in corelating the theory and practice of anesthesia and analgesia to all branches of operative dentistry and to the physio-pathology of patients coming to operation.

Through the Quarterly Supplement of Anesthesia and Analgesia the association prints the papers presented at the meetings of the various organizations of anesthetists, and through the associations of which it is the official organ it is enabled to carry out constructive policies of reform. It is a noteworthy fact that in Georgia, Kentucky, Ohio and Michigan the state medical boards have already taken drastic action against unlicensed administrators of anesthesia, and other sovereign states are in line in putting the same restriction into effect.

One of the greatest advantages of this common meeting to the individual dentist is that it gives him an opportunity to learn improved methods and to obtain the latest information on the subject of anesthesia. The average medical or dental student is not prepared to pass a fair examination from the knowledge of anesthesia which he acquires during his college course. The medical student's knowledge is obtained by giving anesthetics in his interneship. The dental student memorizes sufficient answers to pass the state board. That this information, necessary to administer scientifically an anesthetic, can be obtained is evidenced by physicians and dentists of international reputation present here today who have educated themselves in this science. One of the greatest evidences of advancement in dentistry is the change of attitude regarding reading and studying. Laws which were supposed to be fundamental have changed until it is necessary to really study to keep within reach of these present day investigations. In this program of today methods never before written, illustrations never before shown in any text-book, will be presented to you by the speakers who are to follow.

The present high standards demanded by physicians and dentists demand the most efficient organization and cooperation to culminate its purpose. We must remember that each one of our professions is but a part of the vast mosaic of biology. We must sacrifice personal feelings and professional prejudices to the great cause of advancement in the science of life. Only by the aid of each individual can these things be accomplished, and may each be sufficiently recompensed by the privilege of doing his part!

UNION CENTRAL BUILDING.

HANDLING EMERGENCIES UNDER ANESTHESIA AND ANALGESIA.*

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LOUISVILLE, KY.

In considering this subject I am forced by experience to do so from the viewpoint of a dental anesthetist, as I have had no experience in the administration of an anesthetic for a major operation or other operations which would necessitate a prolonged anesthesia.

In my experience I do not think I have ever administered an anesthetic for a continuous period of over forty minutes. While it may be true the same remedies may apply in surgery, I can only speak from my own experiences in dentistry.

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*Read during the Joint-Session of the Interstate Association of Anesthetists and the National Dental Association at Louisville, Ky., July 26-27, 1916.

To my mind, if there is one person in the world who should be a *dyed-in-the-wool disciple of preparedness,* that person is the anesthetist.

A sign that I have seen lately has attracted my attention, and I should advise all anesthetists to at least make a mental drawing and let it ever stand before him.

WATCH SAFETY FIRST.

The unexpected so frequently happens that one should ever be on his guard, and when an emergency arises be prepared to act. After an accident is a very poor time to seek a remedy. The emergencies with which we have to deal are of such a nature that our notice is rather short, and the time to act is now.

To me it seems that the experienced anesthetist has a sixth sense, which is demonstrated by the fact that time and time again there has been an approaching or threatened trouble which has been recognized and the remedy applied without any evidence of a conscious thought by the anesthetist. This subconscious act may have been brought about by the thorough preparation of the anesthetist, coupled with his experience.

One of the best ways of handling emergencies is to be able to recognize their approach and apply preventatives. While it may be that all of us may not attain to the point of perfect efficiency, it is our privilege, and also our duty, to take every precaution and to make all possible preparations to properly care for those who have shown confidence enough in our ability to place their life in our hands. The *question* is, How?

In the first place, the best moral, physical and mental training obtainable would make a splendid foundation.

A moral man is trusted. One with a pleasing personality inspires confidence, and the mental training is the special weapon with which to fight and win.

By mental training, I mean the knowledge of conditions that exist from which an emergency may arise; the recognition and application of the treatment for these emergencies, and contraindications.

A thorough understanding of human nature is a valuable asset to those who possess it even in a small degree.

The emergencies that may and do arise are from three causes:

(1) Mental and physical condition of patients.
(2) The anesthetic.
(3) The nature of operations.

First, the proper preliminary preparations, as to diet, time of operation and assurance, is invaluable.

The control of the *second* is naturally a thorough understanding of the agent used, its physiological action and its proper administration.

The *third* is proper technic; control of hemorrhage, saliva, props and particle of teeth and debris.

I hardly think it necessary to call attention to, only in a brief way, of the agents necessary in handling emergencies that may arise, and I only refer to them in passing: Tongue forceps, mouth gag, hypodermic, cotton tampons, nitrate of amyl, whiskey, brandy or light wine, aromatic spirits of ammonia, strychnine sulphate 1-20 to 1-60, and, needless to say, a knowledge of methods of artificial respiration.

Syncope and cessation of respiration, dropping back of tongue, accumulation of saliva, blood or vomit has been the only conditions, fortunately, that I have been called upon to handle. And these cases responded very readily to the simple remedies, such as lowering the head, applications of cold cloths and administration of stimulants, cleansing out the mouth and throat and resorting to artificial respiration.

I have had most of my trouble from mucous in the throat, and, in the preliminary examinations, should I find the mouth containing that characteristic frothy, stringy saliva, I require the patient to cleanse out the mouth with cold water and then take two or three swallows. I think this treatment has been beneficial.

I have seen a few such cases during analgesia produced by the dust from the teeth excavated, a preventative measure in operations of this character being to pack lightly the posterior of the mouth with moist gauze.

In all cases of excessive accumulation of saliva, blood or moisture in the mouth, discontinue the anesthetic, let the patient come out. Cleanse out the mouth and throat well before attempting further procedures.

I believe it would be well, even in major surgery, to use a mouth prop. This would enable the anesthetist to cleanse out the mouth or throat instantly without having to take the time to introduce a gag, which, in some cases, would be difficult on account of the contraction of the muscles. It would also enable him to grasp the tongue easily if found necessary.

A capable assistant I have found to be of great value. I have had for some time a graduate nurse who has been of great service to me, not only in calling my attention to unfavorable symptoms and assisting in emergencies, but by handling the patient in such a way as to relieve their mind of fear and anxiety.

ATHERTON BUILDING.

ORAL AND SINUS SURGERY UNDER NITROUS OXID-OXYGEN ANESTHESIA IN THE FORWARD-INCLINED SITTING POSTURE.*

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Philosophize as we may upon the mystery of human life; speculate and theorize upon the plan of existence; be we orthodox or evolutionists, the predominant fact is, that we are here on earth for an indefinite period, and that our residence here is pleasureable and profitable or the contrary, according to numerous conditions in and about us.

The range and variation of the human race are so great that there are but few things common to all men. Some one said that the six feet of earth is the common level, but before that state is reached there is a proposition upon which all men, great and small, rich and poor, learned and unlearned, may unite, and that is that good health is the greatest blessing of life. Health is more to be desired than anything else in the world. True, it must often be impaired or lost in order to be appreciated, but, when lost, its regaining becomes the supreme object in life. Fortunes, great and small, are laid down at its shrine. Sickness and death are terms which strike terror to the hearts of all men. Nature's strongest instinct is self-preservation. It pervades all form of life. To it is due the perpetuation of all life. This instinct is predominant in the human species. We call the antithesis of health, disease. The guardian of health and the relentless foe of disease is the physician.

If, then, it is given to us—and I beg to be understood to include under the term *physicians* all who labor in the field—under whatsoever heading—be it internist, dentist, anesthetist, surgeon, ophthalmologist, laryngologist, or the family doctor; if, as I say, it is given to us to foster and protect the thing of supreme value to all classes of people—should we not feel proud of our calling, and see that such pride is not unmixed with a due sense of grave responsibility which assume to our fellowmen upon donning the mantle of the greatest of all professions.

The age of truly great progress and scientific accomplishment in medicine and surgery dates from the discovery of anesthesia and bacteria. True, there are many diseases which are not due to bacterial action, but in this discussion we shall only consider those conditions which arise from infections, and some of their surgical requirements. Again, we find a division of infections as to their origin, either within or without the body, into exogenous and endogenous.

In recent years we have heard much of focal infections, and today we are endeavoring to measure their far-reaching effects and to cope with some of them surgically.

The profession generally owes much to the dental pathologist for his pioneer discoveries and invaluable contributions to this very important question. In fact, I wish that I might pause here and pay a fitting tribute to the American dentist, who so far outshines his European colleague as the sun does the moon. Whose prowess no longer lies in the celerity with which he can separate one from his *ivories*, in which age his highest ambition was to become notorious as the *lightning dentist*, but who now seeks to excel in prophylaxis, and finds his chief delight in preserving to us that which his predecessor could only extract.

May I say, further, that to my mind the dentist is really a specialist in the field of medicine and surgery, having in his special care the oral cavity—the gateway to the alimentary and respiratory tracts and so of infinite importance.

The almost marvelous progress of dental science in America is better realized when we reflect that less than two centuries ago the blacksmith was the tooth extractor, while the barber honed his razor to perform phlebotomy, from which practice the modern tonsorial sign gets its blood-red stripes.

Only recently the writer was told by a guide in Boston of the versatility of Paul Revere, who, before his famous ride, had achieved local prominence through his skill as a silversmith, goldsmith, coppersmith, blacksmith and dentist.

The anesthetist called in upon those occasions is not described, nor even mentioned, but no doubt he or they were the Jess Willards and Frank Gotchs of that period. No less striking contrast is presented in the field of anesthesia, from the patient being brutally held upon the table by pugilistic strength, to the calm, peaceful slumber for hours, if need be, under modern scientifically controlled anesthesia—represents the two extremes.

The surgeon must be mindful of the invaluable assistance of the anesthetist to whose achievements in his field surgery owes so much.

Returning to our subject, we know that in points of lowered resistance occur culture beds for bacteria. Some locations for these are the alveolar processes; the tonsils and the nasal accessory sinuses. Pathogenic micro-organisms here find the requisites for their propagation—warmth, moisture and pabulum—when such points become veritable hotbeds for the breeding of disease.

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*Read during the Joint-Session of the Interstate Association of Anesthetists and the National Dental Association at Louisville, Ky., July 26-27, 1916.

The infection invades the lymph and blood currents, polluting the same, and the vital organs are thus supplied by a devitalized and impoverished stream. In time the individual's health is impaired, either by a general inefficiency of the bodily functions or by the direct entrance of some definite disease.

This is the age of sanitation and prophylaxis in medicine. The whole trend of scientific endeavor is towards prevention rather than cure of disease. A gigantic wave of instruction to the laity, such as the world has never seen, is now sweeping over the country, teaching the people how to keep well. Columns appear daily and weekly in the public press, and these silent monitors do much in the humblest homes to diffuse the light of knowledge concerning the paramount issue. Much of such literature properly conveys to its readers the essentials of pure air, sunlight, good food, proper clothing, exercise, clean streets and alleys and good drainage.

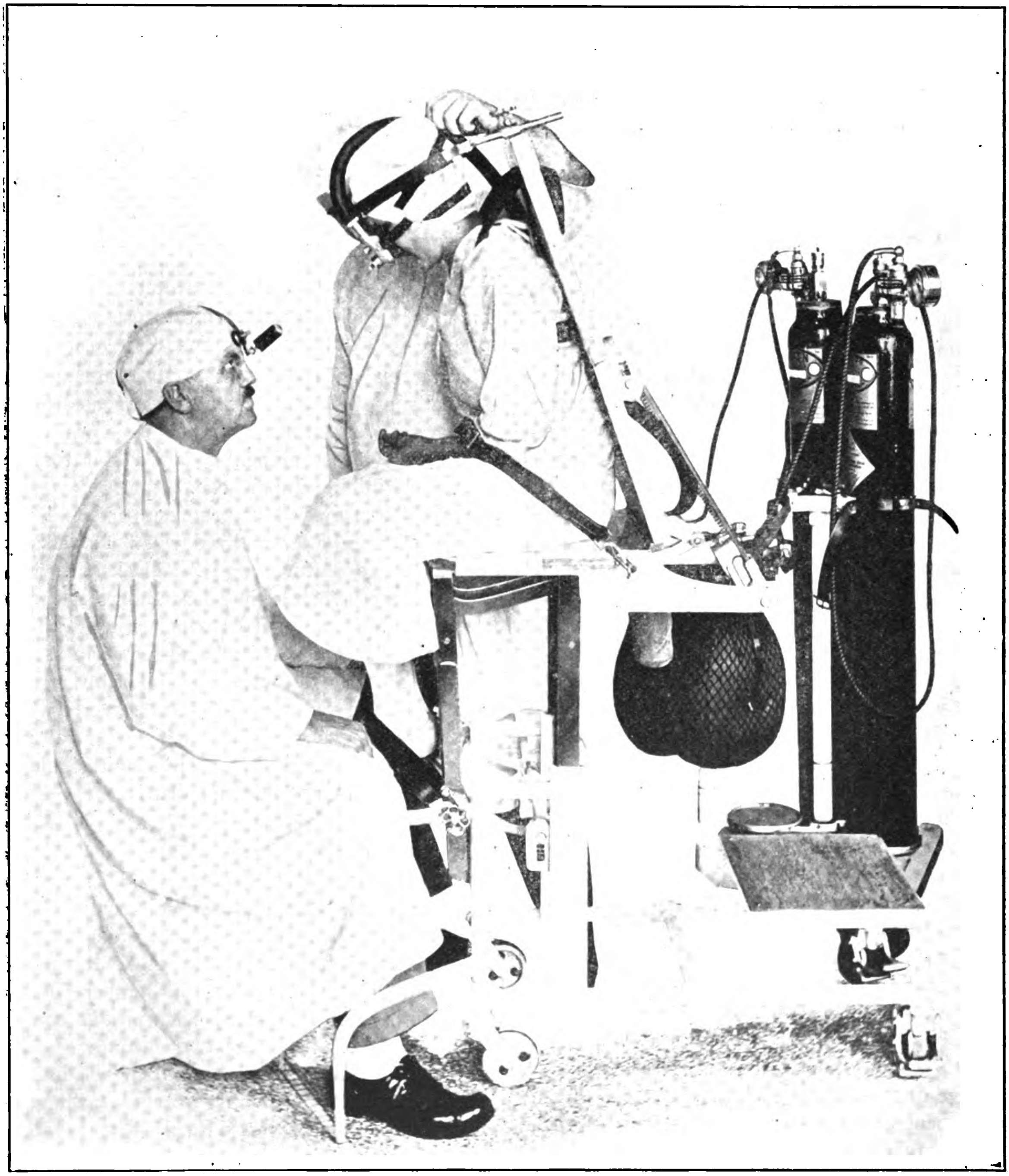

Figure 1. Illustrating the Author's Tonsillectomy Position. The Forward Inclined Sitting Posture for Nose and Throat surgery. Continuous nitrous oxid-oxygen anesthesia being used. (Sterile dressings are omitted to show retaining straps.)

More minutely must we show them that in addition there are great dangers to be found within their own bodies. There are hidden foes—focal points of infection within the tonsils, sinuses and in the gums—which cause many diseases, such as rheumatism, endocarditis and tuberculosis, and we must *clean house* by eliminating from our own bodies such hotbeds for bacterial growth.

Modern surgical methods, under modern anesthesia, may, as it were, pluck the thorn from the flesh and not only lengthen the span of human life, but make for greater efficiency, health and happiness while we abide.

A well-known internist states emphatically that *"the removal of the focus of infection is demanded as a fundamental principle in the treatment of systemic diseases of the chronic type,"*, and, farther, *"to the now well-known relation of focal infections as a chief factor in the etiology of acute rheumatism, chronic deforming arthritis, gonorrheal arthritis, malignant endocarditis, myositis, myocarditis, septecemia of various bacterial types, tuberculosis, nephritis and visceral degeneration, we may add certain infectious types of thyroiditis, with or without hyperthyroidism, pancreatitis, acute and chronic, with or without resulting glycosuria, peptic, gastric and duodenal ulcer and cholecystitis."*

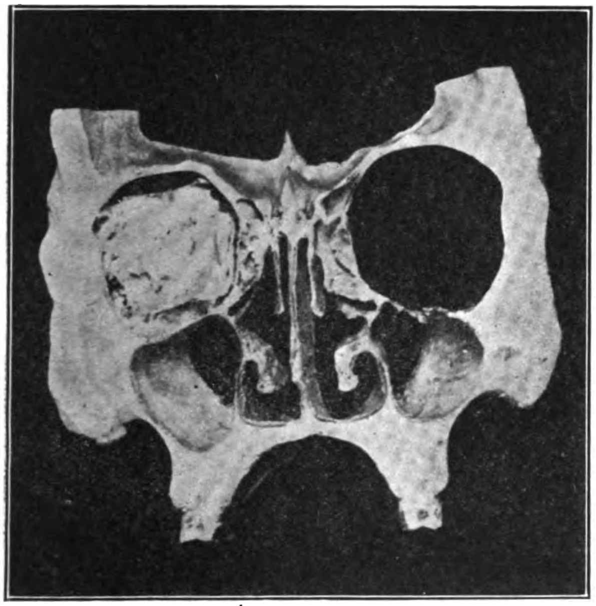

Figure 2. Cross-section of the bones of the face, normal specimen. Note the wide, free passage between the central walls and the middle turbinated body and septum.

Unfortunately, the recognition or diagnosis of the focal infection is not always an easy matter. If it were true that its presence were always a subjective manifestation, then more often would they be detected. On the contrary, however, there are often absolutely no local symptoms, such as pain or soreness, and thus insiduously is the patient's health undermined.

Alveolar abscesses are often unrecognized by the patient; and only film roentgenograms disclose their presence. Chronic sinusitis may exist for years unknown, and a large percentage of chronic tonsillar infections, which are so extensive as to ruin the health, frequently give no rise to sore throat.

The treatment of focal infections is essentially surgical, either to establish drainage and ventilation or to extirpate the infected tissue. I shall gladly omit those renal, appendiceal and other foci belonging to the general surgeon, from this paper. Neither shall I presume to discuss those of the alveolar processes before this body, but I shall limit my remarks to the sinuses and tonsils, which are of interest to dentist and rhinologist alike.

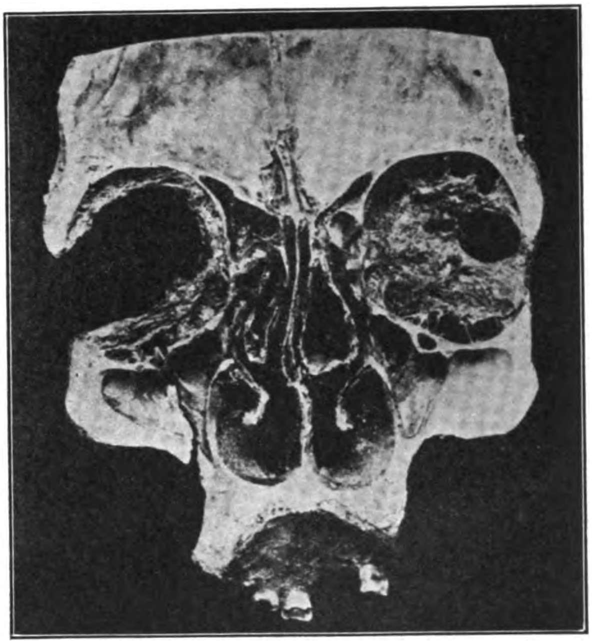

Figure 3. Cross-section showing a large middle turbinated bone which occludes the maxillary sinus osteum. This turbinate is hollow, containing an accessory ethmoid cell, and is a congenital malformation.

The nasal accessory sinuses are the frontal, ethmoidal, spenoidal and the maxillary or the antrum of Highmore. Physiologically they act as an auxillary to the nose in supplying moisture to the air we breathe. They also increase the resonance of the voice and strengthen and lighten the bones of the face. These cavities depend upon two things for their hygienic state: ventilation and drainage. Any deformity, injury or disease within the nose which interferes with the ventilation or drainage may prove to be the cause of an acute or chronic sinusitis. The ostea, or openings of all these sinuses, except the sphenoid, is found in one vital area of the nose; this is the hiatus semi-lunaris, or the uncinate groove, beneath the middle turbinated bodies. This is called the *vicious circle* of the nose. It is here that most trouble often originates. Anything, such as septal deflections, congenital deformities, either of the septum or of the middle turbinate, or chronic catarrhal enlargements of the turbinated or new growths, polypoid usually in character, may obstruct the nasal ostea of the sinuses at this point. Such obstructions, if long continued, may result in chronic sinusitis. The ethmoids are usually the first affected, and the next the frontal, then the maxillary, and the sphenoid least of all.

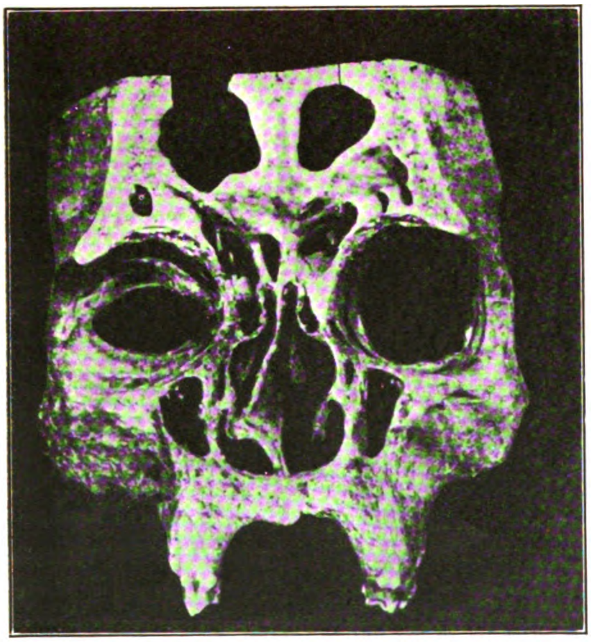

Figure 4. Cross-section showing a deflected septum, which partially obstructs the drainage and ventilation of the sinuses.

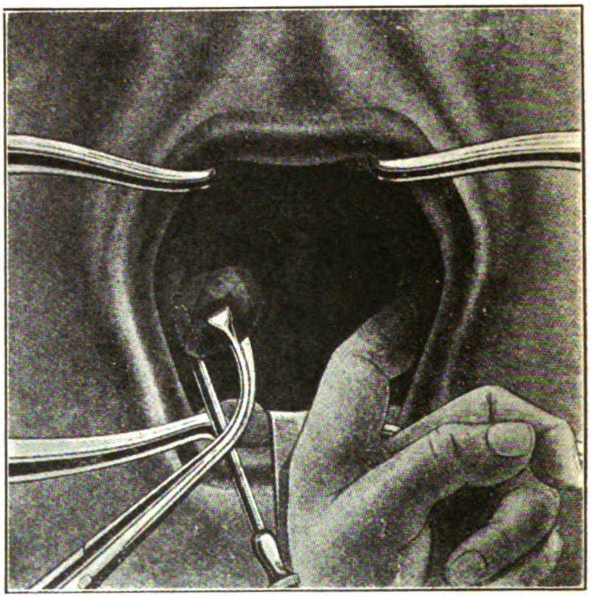

Figure 5. The author's tonsillectomy. A second tenaculum and snare are applied when the finger completes the dissection and both tonsils are simultaneously removed.

The maxillary sinus, by reason of its peculiar position relative to the *vicious circle* being below it, and having its natural opening on a level with its roof, is by its natural formation particularly susceptible to infections which gravitate into it from one or both of the sinuses situated above. Drainage is unfavorable from it because the secretions have to run uphill, as it were, to the ostium. Infected material, therefore, may be imprisoned in this cavity, which is a veritable trap for the dregs from the nose and other sinuses. At the most dependent portion of this sinus, and thus where the toxic matter would be expected to gravitate and remain, we find the roots of the teeth penetrate into the antrum cavity. These roots are covered only by mucus membrane. With this anatomy, dental surgeons are quite familiar, but dental pathologists have been too generous in accepting the majority of the responsibility for antrum infections, claiming as high as 75 per cent. of such cases arise from dental infections. That some cases do owe their origin to a primary dental-caries which break through into the antrum, there is no doubt. However, allow me to repeat that the maxillary sinus is an accessory nasal cavity having a natural opening into the nose, and not an accessory oral cavity. I have personally never seen a case of abscess of the antrum which did not present some signs of coexisting intranasal infection. Furthermore, given a case of chronic antrum infection, where there has been retention of toxic material for a long time, this material gravitating to the most dependent portion, which is the location where the roots of the teeth penetrate, I ask, is it not possible, or at least reasonable, to expect that such teeth may become infected *from* the antrum, and thus reverse the supposed order? Therefore, I wish to take the advanced position of relieving the dentist of much of the responsibility for the disease in this sinus, believing that dental infections are often secondary to nasal infections in this region.

Whether or not this suggestion meets with your approval, my next statement must go unchallenged, and that is, that the average dentist fails to take advantage of the opportunity daily afforded him to be a leader in the field of prophylaxis, so far as certain focal infections are concerned. Too often he thinks only of the alveolar foci. He should realize that his opportunity to discover also both sinus and tonsillar disease is almost enviable.

He sees diseased tonsils daily. He can, with the aid of a nasal speculum, see disease within the nose also daily. The nasal speculum should be a part of every dentist's equipment, and no dental examination should conclude without the inspection of the nose and also the tonsils, not only as a diagnostic, but as a prognostic measure.

It is my deep conviction that the intent of all surgical operations should be to restore the parts as nearly to the normal state as possible, with the least disfiguration in sinus work, keeping in mind a statement made earlier in this paper, that the health of the sinuses depends upon drainage and ventilation; these we should first restore to a diseased sinus, with the minimum amount of the destruction of tissue.

I decry the wholesale disfiguring external operations of radical sinus surgery, and plead for conservative assistance to Mother Nature by intranasal procedures wherever such means give any promise of relief. No external mutilation of a patient's face is justifiable until after other measures have failed, and the removal of a sound tooth to secure drainage should not be the first procedure.

Intranasally, the region of the middle turbinate must be cleared and freed from pressure so that the sinus ostea may remain open. The middle turbinate must often be partially or wholly removed, septal deflections straightened, polypi removed and diseased ethmoid cells opened for drainage or removed if necrotic.

Surgery of the maxillary sinus, a subject in itself, can only be briefly mentioned. Freeing the natural opening alone is sufficient in many cases. This, together with a counter opening in the naso-antral wall beneath the lower turbinal, sometimes removing a portion of the antrum end of the same, cures the great majority of cases. Some chronic cases with granulations, polypi and septi requires a larger opening in the sinus wall to permit currettage and ocular inspection. For this there have been a number of methods proposed. Experience proves that the more the antrum is left as an accessory nasal cavity, that is, the smaller the opening in the naso-entral wall, the better. Large openings permit irritating substances from the air to maintain a constant irritation of the sinus lining membrane.

For the surgical treatment of nasal and sinus affections. I prefer nitrous oxid-oxygen anesthesia in the forward inclined-sitting position, to be described later.

The tonsil is, without doubt, the greatest offender in the whole field of focal infections. Tonsil tissues, especially after the activity of the gland ceases in early childhood, furnishes a most fertile culture bed for micro-organisms. Unlike most other locations, the focus is here accessible and permits of direct ocular inspection. Unlike sinus and alveolar processes, which permit only of drainage followed by therapeutic measures to restore the parts to a normal condition; in the case of the tonsil, the whole diseased mass is easily removed, thus eliminating at once from the body the source of toxemia. Unfortunately, we meet an issue in the tonsil question which is not encountered in any other infected region—not even now in appendicitis—the teleological question. Every day I am asked: "Why does nature give us tonsils if they are not for some use?" and "Should they not be treated and retained?" and "If a portion of the tonsil only is diseased, why remove the whole gland?" This last question is propounded also by physicians, and some specialists still advocate a tonsillotomy, at least they preform that operation.

An attempt to answer these questions here would be an imposition upon your patience, as it would mean opening up a question the discussion of which is almost as voluminous as was that regarding the appendix two decades past. The following statements, however, are regarded by the writer as facts, after careful observation: First, the tonsil function, if it has any, is preformed and concluded early in life. Its activity ceases by the eighth to the twelfth year, after which its decline begins and its tissues are incapable of repair. Second, like the man who says a thing cannot be done, is interrupted by someone else doing it, so those who declare that tonsillectomy should not be preformed are confronted constantly by its beneficial effects. I am speaking, of course, of diseased tonsils only which, through careful inspection by lifting the submerged tonsil out of its bed (and it is this variety most often diseased), an accurate diagnosis can be made. After the thorough removal of all tonsil tissue in its capsule, we note a certain and rapid improvement in health in every case.

To say, therefore, that tonsillectomy is overdone, simply because it is done frequently, is unwarranted. To say that it is poorly done, that it is attempted by men unfamiliar with its anatomical structure and surroundings, whose technique is faulty, and whose skill is unequal to the surgical requirements of the case, by men who are unable to cope with complications should they arise; whose instruments, anesthetic position and method are conductive to only a partial removal of the tonsil tissue, together with more or less mutilation of the delicate throat and palatal muscles, would be a broad statement, but, if true, would account largely for the general dread of the tonsil operations, and also for the continued ill health in certain cases, owing to the retention of diseased tissue.

That there are certain dangers in tonsillectomy cannot be denied. It is always a major operation, preparation for it should be in keeping with those of major surgical operations. It is always a hospital operation.

It is the firm conviction of the writer that the common dangers can be avoided. Among these dangers are the anesthetic, asphyxiation from inspired blood and secretion, hemorrhage and shock.

The anesthetic of choice is nitrous oxid-oxygen. It is not profoundly toxic, such as chloroform or ether. Anesthesia is quickly induced. Its administration may be continuous, permitting an uninterrupted surgical procedure. There is absence of mucus secretions. Pure oxygen quickly awakens the patient, simultaneously checking any bleeding. There is no nausea following, and it is altogether not an unpleasant experience for the patient.

Inspiration of blood and secretion into the lungs is an immediate danger to the patient by asphyxiation, and a remote cause of pulmonary sepsis, pneumonia and death. Various positions, such as hanging the head downwards, placing the patient on the side, and various aspirators and suction pumps have been devised, in attempts to exclude these secretions from the larynx, trachea and lungs, for bear in mind that only in nasal or oral surgery, including exodontia, does blood per se become a danger factor. A patient can drown from a much smaller quantity of blood inspired. To avoid this danger in nasal and oral surgery, I have in my technique called to my assistance a great natural force—the force of gravity. I place the patient in such position as to allow all secretions to flow outward and downward out of the mouth or nose—the forward suspended sitting posture. A special chair is used, capable of attaining this position with all ages and sizes of patients. The operator's stool is quite low, so that the illumination from his head lamp is directed well upward. The patient's body leans well forward, about the angle 60 degrees, and chin still further declined so that the oral axis is 45 degrees or less. This obviates the necessity in sinus work of the post nasal plug, and in tonsillectomy of any swabbing or suction apparatus, and absolutely prevents blood inspiration when nitrous oxid-oxygen is administered.

Hemorrhage is reduced to a negligible factor by the dull dissection and finger enucleation, no sharp instruments being employed. The tonsil is simply peeled out of its capsule. It has been demonstrated that the tonsillar vessels very rarely bleed, but that profuse hemorrhages usually come from the severance of vessels in the surrounding muscles by sharp dissection or cutting through tonsil tissue. Postoperative hemorrhage is often induced by wretching and straining from ether or chloroform nausea and vomiting, which we avoid.

The danger of shock in any surgical operation is proportionate to the character and duration of the operation, and to the loss of blood.

This technique shortens the operative period to three minutes or less for the removal of both tonsils and adenoids; and sinus work is proportionately shortened and may be done thoroughly. This is due to the perfect view which the operator has in this position; his field clear of blood, without waiting for sponging, no time lost between anesthetic periods, as it is continuous, and both tonsils are removed at the same time by two sets of instruments.

The anesthetic is administered with equal facility in both nasal and oral operations, the process only being reversed. In some cases a partial nasal obstruction renders the oral administration easier than nasal.

In nasal and sinus surgery a special mouth inhaler is used, the gases being expired through the mouth; and in oral work both a small nasal inhaler and a mouth hook are simultaneously employed whereby the gases can be forced with sufficient rapidity to induce anesthesia, preventing the inhalation of air through the open mouth.

425 OHIO BLDG.

EXTRAORAL CONDUCTIVE ANESTHESIA FOR ORAL SURGICAL OPERATIONS.*

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The possibility to fully control the pain in operations about the mouth and jaws by conductive anesthesia may be called the greatest progress in oral surgery that has been achieved in the last decade. Local anesthesia does not only free the region of the operation from the presence of the anesthetist and his appliances, but also eliminates the dangers attending general anesthesia, namely, the swallowing and aspiration of blood and pus. The absence of vomiting after the operation is another advantage eliminating the disintegration of the wound by the vomitus. The partial co-operation of the patient during the operation, the hemostatic action of the injections which makes the operation less bloody, and the absence of certain instruments used to administer the anesthetic or to open the mouth, make possible aseptic methods and better technic.

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*Read during the Joint-Session of the Interstate Association of Anesthetists and the National Dental Association, at Louisville, Ky., July 26-27, 1916.

I. Teeth, Alveolar Process and Gums of Upper Jaw.

Incisor region	teeth and labial part	ant. sup. alveolar	infraorbital	Sedond Division of V.
	palatal part	naso palatine	spheno-palat. G	
Bicuspid and molar region	teeth and buccal part	middle and post. sup. alveolar	infraorbital	
	palatal part	ant. palatine	spheno-palat. G	

II. Teeth, Alveolar Process and Gums of Lower Jaw.

Ant. region of 1st Bicuspid	teeth	inf. alveolar	inf. alveolar	Third Division of V.
	labial part	mental	....	
	lingual part	lingual	....	
Post. region from 2d bicuspid to 3d molar	teeth	inf. alveolar	....	
	buccal part	buccinator	....	
	lingual part	lingual	....	

III. Inervation of Upper Jaw, Maxillary Sinus, and Lower Jaw.

Upper Jaw	....	entire	....	2d Division of V.
Max. Sinus	external part	sup. alveolar branches	infraorbital	2d Division of V.
	internal part	nasal branches	spheno-palat. G.	
Lower Jaw	....	entire sensory branches	....	3d Division of V.

IV. Inervation of Palate, Cheeks, Tongue, Floor of Mouth, Lips.

Hard Palate	ant. part	naso. Palatine	sphenopalat. G.	2d Division of V.
	post. part	ant. palatine		
Soft Palate	soft palate	mid. & post. Palat.		
	uvula	mid. & post. Palat.		
Cheeks	mucous membrane	buccinator	....	3d Division of V.
Tongue	ant. part	lingual	....	3d Division of V.
	post. part	lingual branch	....	Glosso-pharyngeal
Floor of Mouth	....	lingual	....	3d Division of V.
Lips	upper lip	labialis superior	infraorbital	2d Division of V.
	lower lip	mental	inf. alveolar	3d Division of V.

V. Inervation of the Skin of Face and Neck.

Skin of outer cantus	Lachrimal		
Upper Lid, Forehead and Crown	Supra-orbital	Frontal	Ist Div. of V.
	Supra-trochlear	Frontal	
Skin of Inner cantus	Infratroclear	Naso-ciliary	
Tip of nose	Ext. nasal		
Ant. Part of Temple	Zygomatico-temp.	Zygomatic	2d Div. of V.
Malar Region	Zygomatico-facial		
Lower Eyelid and ant. part of cheek	Palpepral	Infraorbital	
Ala of nose	Nasal		
Upper Lip	Labial		
Angle of Mouth	Buccinator		3d Div. of V.
Ant. part of Auricle, Temple and Cheek	Auricolo-temporal		
Lower Jaw and Chin	Mental	Inf. alveolar	
Angle of Jaw	Ant. branch of great Auricular		Cervical Plexus
Post. Auricular region	Post. branch of great Auricular		
Inf. border of Jaw	Sup. cutaneous Coli		
Ant. part of neck	Inf. cutaneous Coli		

Notwithstanding these great advantages, we must, however, select our cases. Children, as a rule, are poor subjects for large surgical operations under local anesthesia; also sometimes very intelligent older children form exceptions, but even then it depends a great deal on the extent of the operation. Amongst the adults there are, of course, those who will only consent to an operation when performed under general anesthesia, while many patients for whom general anesthesia is contraindicated and dangerous can well be taken care of with the local methods. The excitable, nervous and timid patient who dreads knowing what is going on, or is afraid of the instrumentation, can almost always be taken care of easily by proper pre-anesthetic medication.

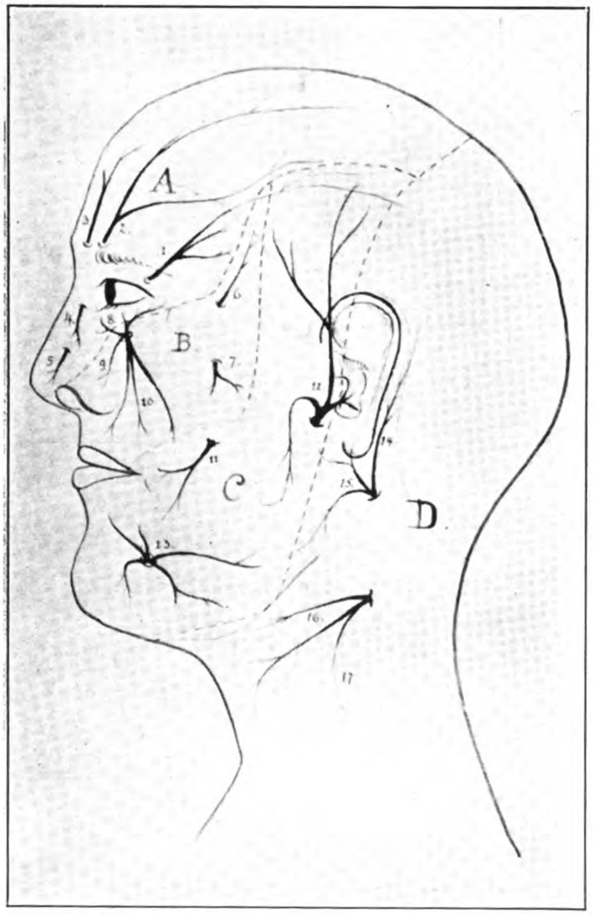

Figure 1. Lateral view of face showing nerve supply of the skin. 1. Lachrymal N. 2. Supraorbital N. 3. Supratrochlear N. 4. Infraorbital N. 5. Ext. nasal N. 6. Zygomatic-temporal N. 7. Zygomatic facial N. 8, 9, 10. Palpebral, nasal and labial branches of the infraorbital N. 11. Buccinator N. 12. Auriculotemporal N. 13. Mental N. 14, 15. Posterior and anterior great auricular N. 16, 17. Superior and inferior cutaneous Coli N. *A* supplied by 1st division of V; *B* supplied by 2nd division of V; *C* supplied by 3d division of V; *D* supplied by cervical nerves.

The larger number of dental and oral surgical operations can be performed under anesthesia produced by the *Intraoral* methods. The *Extraoral* methods are indicated: (1) For all extensive cases where a large area is to be anesthetized and when the common nerve trunk supplying this area is not accessible from the mouth. This is especially the case for operation about the upper jaw. (2) For cases where deep penetration of the tissue is necessary to reach the nerve trunk, we should prefer the extraoral methods to the intraoral ones, as they permit perfectly aseptic technic and therefore eliminate the danger of infection.

SENSORY INERVATION OF THE ORAL REGIONS.

The success of local anesthesia depends a great deal upon the exact knowledge of the sensory inervation and nerve anestomosis of the parts to be operated on. A clear picture of the nerves and anatomical relations of the surrounding parts should be constantly before the anesthetist's mind.

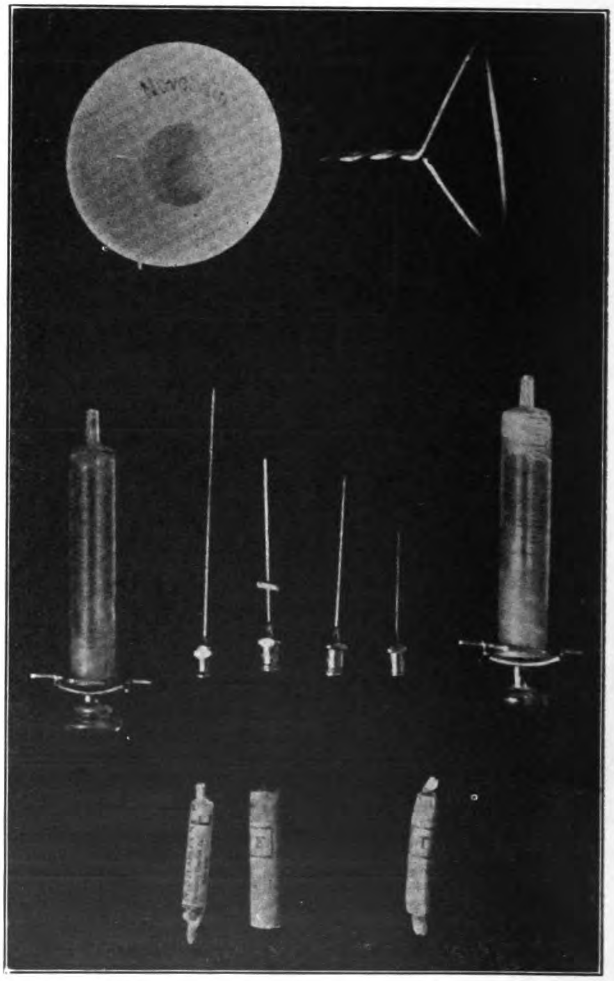

Figure 2. Instrumentarium. Porcelain cup for dissolving and sterilizing novocain. Luer syringes of 5 cc. capacity. Assortment of needles. *E, F.* and *T.* tablets of novocain-suprarenin synthetic.

PREANESTHETIC MEDICATION.

For ordinary dental or small oral surgical operations, no special preparation is required. Extremely nervous patients and children may receive bromural-knoll (alphabrom isovalerylurea), which is an excellent sedative.

If *extraoral* injections are used, preanesthetic medication is always indicated. For small things bromural is sufficient, but for deep injections followed by a severe operation, I give veronal gr. X before retiring and morphia gr. 1-3 thirty minutes before the operation. This stupifies the patient sufficiently so as not to mind the insertion of the needle. It also takes away the terror of the operating room and instrumentation, which are otherwise more or less feared by the patient.

INSTRUMENTS AND DRUGS.

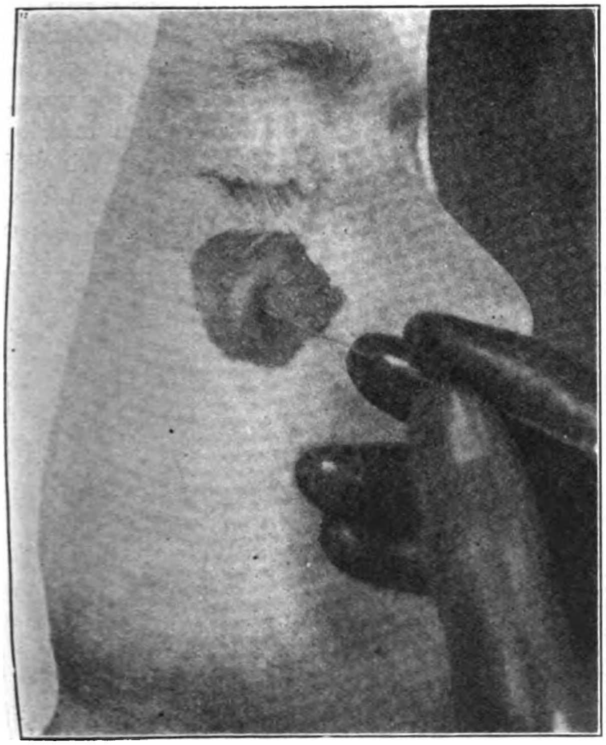

Figure 3. Shows the needle about to be inserted into the infraorbital foramen. Ordinarily a short and very firm needle is used for this injection.

For the extraoral methods, I use a Luer or Record syringe, containing 5 cc. and steel needles of various lengths (Figure 2).

For the anesthetic, I used a 2 per cent. Novocain solution with 0.000,02 gram. Suprarenin synthetic to one c. c. This is prepared in the Novocain cup immediately before use, by dissolving the T or a combination of E and F tablets in Ringer solution. For local injections, which are sometimes used in addition to the conductive method in order to control anastomosis or bleeding, I use a solution containing more suprarenin, viz., 0.000,05 to one cc., prepared by dissolving one E tablet in one cc.

TECHNIQUE OF ADMINISTRATION.

Extraoral injections must be made under strict aseptic conditions. He who is not familiar with surgical aseptic methods should not undertake to use extraoral anesthesia.

The skin of the patient's jaw is prepared for the injection by application of tincture of iodine over a large area. The washing and shaving of the skin should be undertaken a reasonable time before the operation.

If preanesthetic medication is used, no special application is needed to reduce the pain from the needle. A small amount of the solution is injected under the skin. After the needle is fully inserted, suction should be applied before injection. If blood is drawn into the syringe, it is a sign that the point of the needle entered a vessel. It should then be withdrawn a short distance.

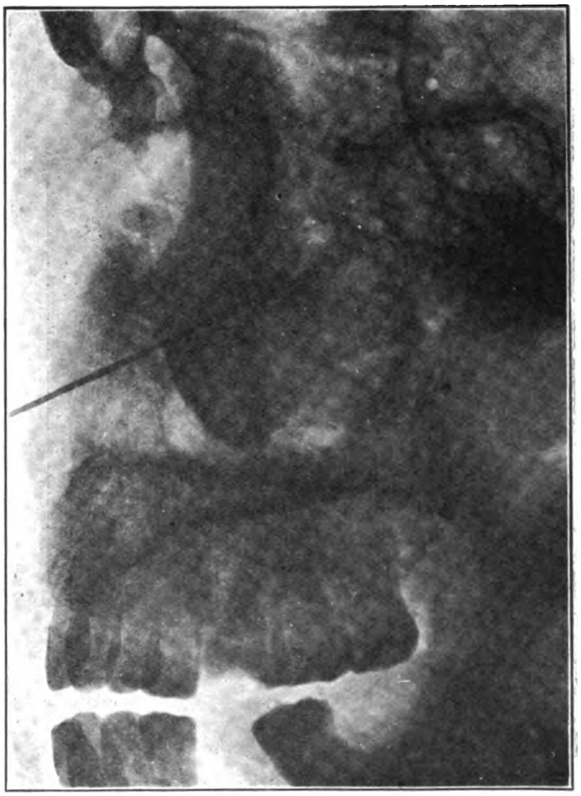

Figure 4. Radiograph showing the needle inserted into the infraorbital foramen.

Maxillary Anesthesia.

INFRAORBITAL METHOD.

Landmarks. The infraorbital foramen can be palpitated easily under the inferior border of the orbit (Figures 3 and 4).

Injection. A very fine needle is inserted directly into the infraorbital foramen from the surface of the skin a distance of about 1½ cm. It is important to make sure that the needle is not inserted into a vessel, which would be indicated by discharges of blood. One and one-half cc. is injected, with low and even pressure.

Waiting Period. The anesthesia usually occurs in a very short time.

Area Anesthetized. Same as in the intraoral method, namely, the upper incisor teeth, labial part of gum and the area supplied by the palpepral, nasal and labial branch of the infraorbital nerve.

Duration of Anesthesia. In this method we do not depend upon infiltration of the anesthetic solution through the infraorbital foramen, as in the intraoral method, and therefore get a quicker and more lasting result.

ZYGOMATIC AND MAXILLARY METHOD.

The intraoral methods of conductive anesthesia of the upper jaw have never been as satisfactory as those of the lower jaw, because there is no place where the blocking of the whole maxillary division can be undertaken successfully from the inside of the mouth, and because the point of inserting the needle is not remote enough from the field of operation to come outside the disease zone in extensive lesions. Nevertheless, we can well take care of the teeth and their immediate surroundings with the intraoral conductive and the infiltration methods. But for large surgical operations in the oral cavity, and especially in war surgery, the maxillary injection is a great advantage.

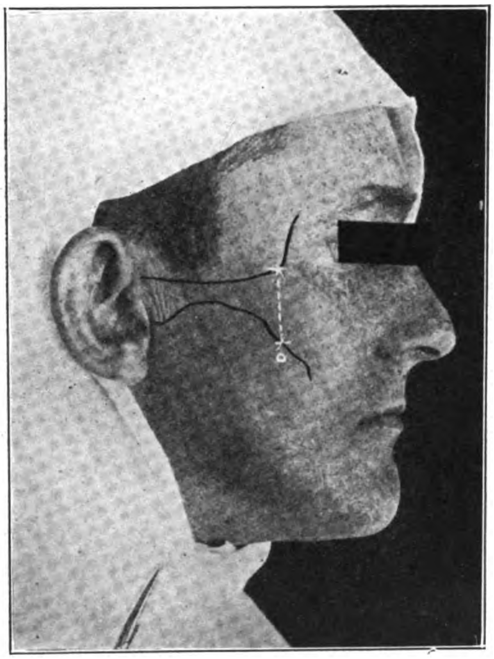

Figure 5. Method of finding injection point for the zygomatic and maxillary injection. Find the zygomatic angle and draw a line from this point vertically downward. ½ cm. below the place where this meets the inferior border of the zygomatic process is the point for the insertion of the needle.

Landmarks. Palpitate the superior border of the zygomatic arch and find the place where it forms a right angle with the superior margin of the orbit. This is called the *zygomatic angle.* From this point draw a vertical line downwards, and the point for insertion of the needle is about ½ cm. below the place where this meets the inferior border of the zygomatic arch (Figure 5).

Zygomatic Injection. With the teeth in occlusion, insert the needle with syringe mounted. A few drops are injected under the skin. Advance in a vertical direction to the cheek for 2 to 3 cm. Here we strike the maxillary tuberosity. If only the posterior molars are to be anesthetized, the injection can be made here and we have the extraoral method of the zygomatic injection.

Maxillary Injection. If the whole upper jaw is to be anesthetized, we continue in the same direction (Figures 6 and 7). Sometimes it is necessary to direct the needle a little further backwards to pass by the tuberosity which is felt for orientation, and enter the spheno-maxillary fissure. After further advance of 2 cm., we again find bony resistance when the point of the needle strikes the inferior part of the anterior surface of the larger wing of the sphenoid bone, just below the foramen rotundum. The depth at this place is about 5 cm. One to 2 cc. is injected. The injection is purposely made below the foramen to keep away from the nerves supplying the eye.

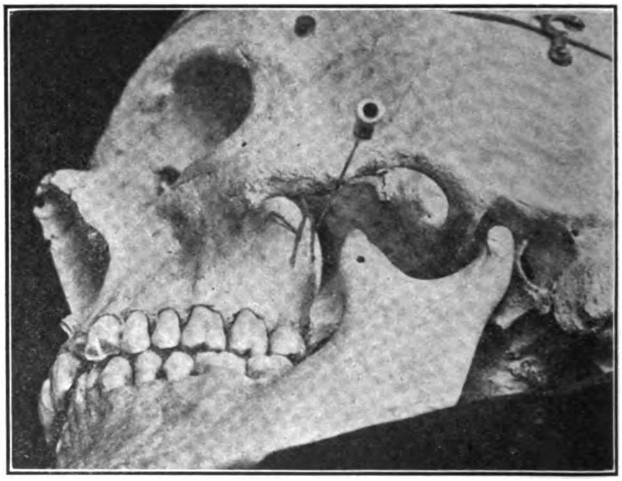

Figure 6. Shows a skull with the needle in position for anesthetizing the second division of the V nerve below the foramen rotundum.

Symptoms of Anesthesia. After about five minutes the patient feels numbness in the nose, sometimes also in the upper lip, but the symptoms are much less marked than in the lower jaw.

Waiting Period. Complete anesthesia usually occurs in from ten to fifteen minutes.

Area Anesthetized. Practically all the parts supplied by the maxillary division are anesthetized, the maxillary bone, the teeth, the gum, half of the palate and upper lip, the anterior part of the cheek, the skin of the nose, the antrum and part of the nasal cavity.

Anastomosing and Communicating Nerves. Branches from the other side have to be considered and the facial branches of other divisions of the fifth.

Duration of the Anesthesia. The anesthesia lasts from 2 to 3 hours.

Undesirable Symptoms. Anemia in the region of the infraorbital artery sometimes causes circumscribed whiteness on the part of the cheek which is supplied by it.

Diffusion of the solution into the orbit is liable to occur, causing occular disturbances of short duration. The occulomotor or abducens nerve may be infiltrated, causing double sight, weakness in the upper eyelid, dilation of the pupil and, if some of the accompanying vessels are affected, anemia of the eyelids will be observed. Sometimes anesthesia of the soft palate gives difficulty in swallowing.

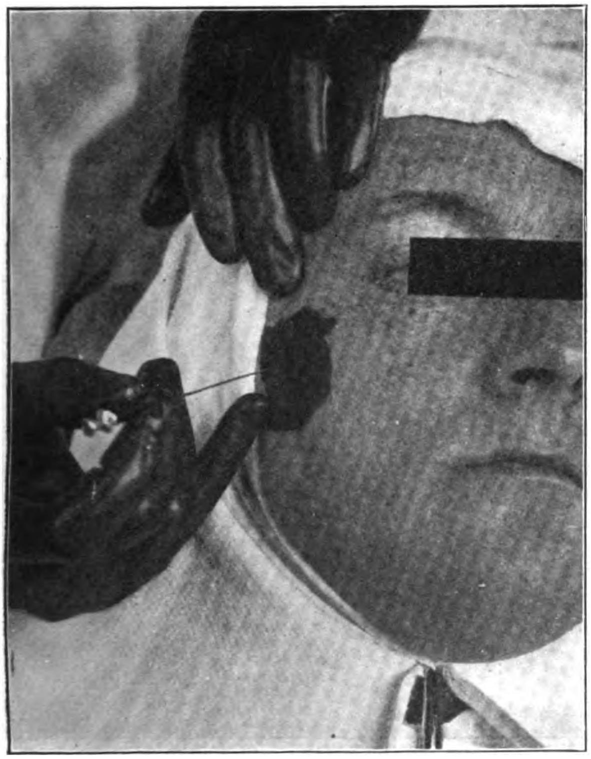

Figure 7. Shows the needle about to be inserted for the extraoral maxillary injection.

All these complications, which occasionally accompany the anesthesia, last from fifteen minutes to two hours, and are of no serious consequence, merely inconveniencing the patient for a short time. The patient should be told that these conditions occur at times and that they are of a harmless nature, so that he will not be frightened and lose his confidence. As this method is only used for operations of a serious and extensive nature, we can consider the occasional occurrences of the complications a small factor compared with the advantage of positive asepsis and the disadvantages of general anesthesia for such operations in the mouth.

Mandibular Anesthesia.

EXTRAORAL PTERYGO-MANDIBULAR METHOD.

This injection is made into the same place as the intraoral one, namely, the pterygo-mandibular space. It is indicated whenever the intraoral method cannot be used, as is often the case in fractures of the mandible and trismus of the muscles of mastication.

Landmarks. A line is drawn from the tragus of the ear to a point marked by the anterior margin of the masseter muscle and the lower border of the mandible (Figure 8). The point where the mandible is divided into two halves marks the projection of the mandibular foramen upon the skin. The place to insert the needle is at the inner side of the lower border of the mandible, 2 cm. anterior to the angle of the ramus (Figure 9).

Position of left hand for the injection on the right side: Place index finger behind and parallel with the posterior border of the ramus, the thumb in the same direction, its tip touching the lower border of the ramus.

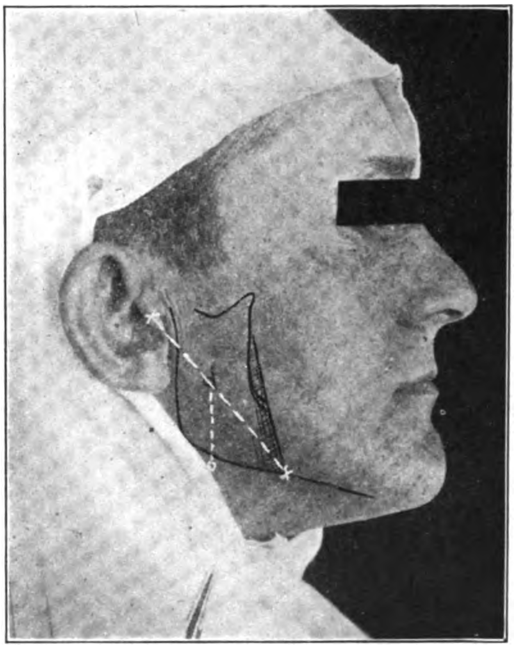

Figure 8. Landmarks for finding the projection of the mandibular foramen upon the skin. Draw a line from the tragus of the ear to a point where the anterior border of the masseter muscle meets the infeior border of the mandible. Divide in halves. The point of division marks the location of the foramen.

Position of the right hand for injection on the left side: The left arm is passed around the patient's head, the thumb is placed behind the posterior border of the ramus and the index finger bent around the angle of the ramus. The head is bent towards the opposite side. The dismounted needle is now inserted at the point described.

Advance in a parallel direction to the posterior border of the ramus, marked on the left side by the thumb and on the right side by the index finger. After the needle has been inserted about 4 cm., we are in the pterygo-mandibular space, and as the direction of the needle is parallel with the nerve it does not matter if the needle is inserted a little too far. Inject 2 cc. (Figure 10).

Symptoms of Anesthesia. Numbness of the lip is felt about five minutes after the injection.

Waiting Period. Anesthesia takes effect in fifteen minutes.

Area Anesthetized. The lower teeth and jaw on the side injected, the lower lip and anterior part of gum.

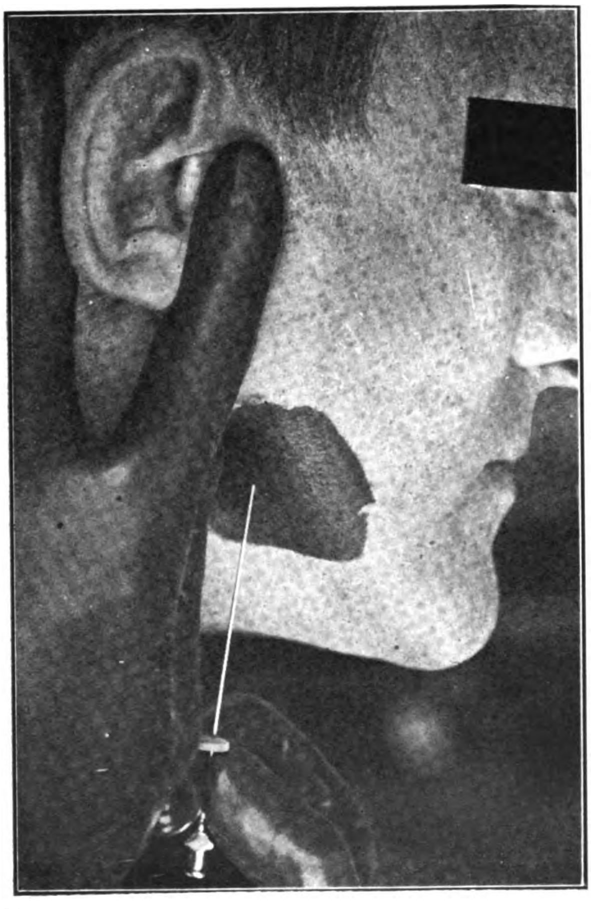

Figure 9. Shows the needle about to be inserted for the extraoral pterygomandibular injection.

Anastomosing and Communicating Nerves. The inferior alveolar nerve on the other side anastomosing in the incisor region and the lip. The lingual nerve supplying the inner part of the gum. If anesthesia of this nerve is required, it has to be taken care of separately. This can be done in two ways—either by withdrawing the needle about 1 cm. and reinserting it in the vertical direction which brings it further forward, or by inserting the needle 5 cm., which brings it higher up, near the place where the inferior alveolar and lingual nerve divide.

Duration of Anesthesia. Same as for the intraoral method, namely, about one hour if 2 cc. is injected.

Failures. The advance of the needle may find bony resistance in the depth of 3 cm. This comes from false direction of the needle point, striking a well-marked internal oblique line. The needle may strike bone at once, which may indicate a well-marked protuberance for the attachment of the pterygoid muscle. These mistakes are remedied by changing the direction of the needle.

MANDIBULAR INJECTION.

Anesthesia of the mandible can be accomplished very successfully by the intra and extraoral method of injecting into the pterygo-mandibular space. For the operations on the ramus, especially the superior part, and if the pterygo-mandibular injection is contraindicated on account of pathological conditions, we may resort to the mandibular method.

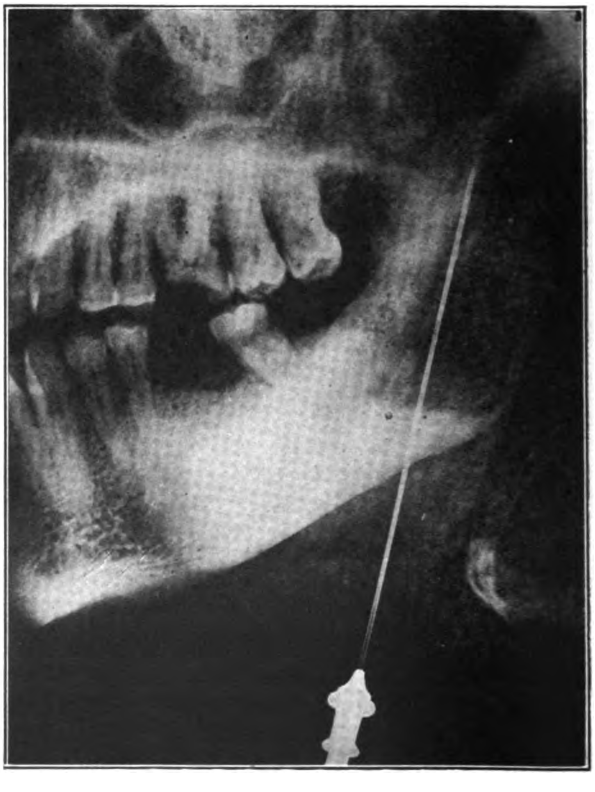

Figure 10. Shows a radiograph with the needle inserted for the pterygomandibular injection.

Landmarks. A line is drawn from the zygomatic angle to the tragus of the ear. Divide into halves just below this point, and the inferior border of the zygomatic arch is the place to insert the needle (Figure 11).

Injection. Insert the needle and advance in a slightly upward direction. The needle passes anterior to the neck of the condyle and below the zygomatic arch (Figures 12 and 13). A few drops

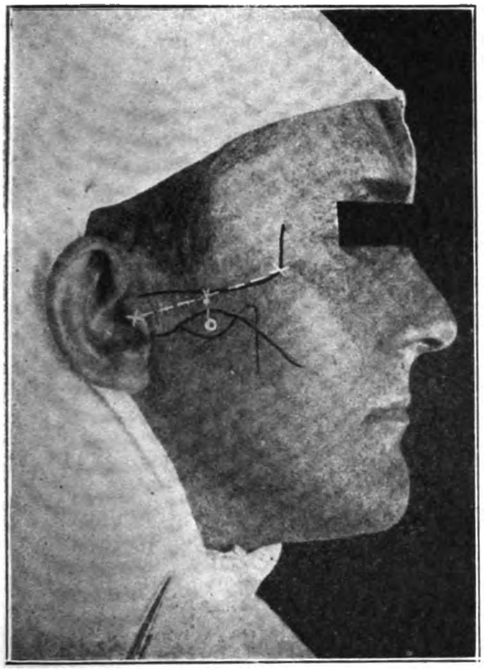

Figure 11. Shows landmarks for the mandibular injection.

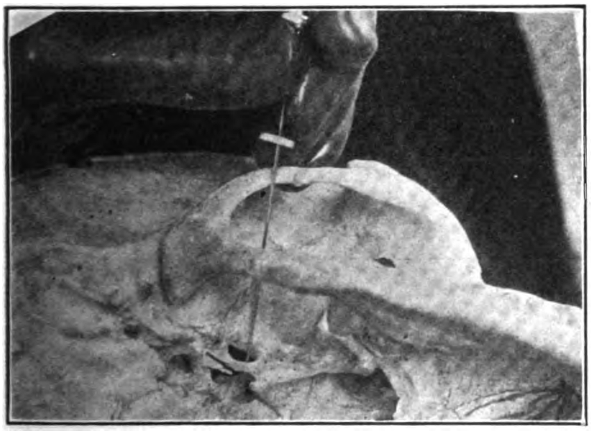

Figure 12. Shows a skull with the needle inserted to anesthetize the third division of the V Nerve.

may be injected at once. After advancing to a depth of 3-4 cm., the point of the needle should strike the smooth infratemporal surface. Now feel your way along for one more cm. until you strike the mandibular nerve, when the patient notices suddenly a radiating pain in the region supplied by it. Inject from 2 to 5 cc.

Symptoms of Anesthesia. The same as in the pterygo-mandibular injection.

Waiting Period. Ten to twenty minutes, depending on how close we get to the nerve and on the amount of solution used.

Area Anesthetized. Teeth and bone of the mandible, lower lip, chin, corner of the mouth, lower part of the cheek and temporal region.

Anastomosing and Communicating Branches. The anastomoses from the other side and, in some operations, branches of the cervical plexus.

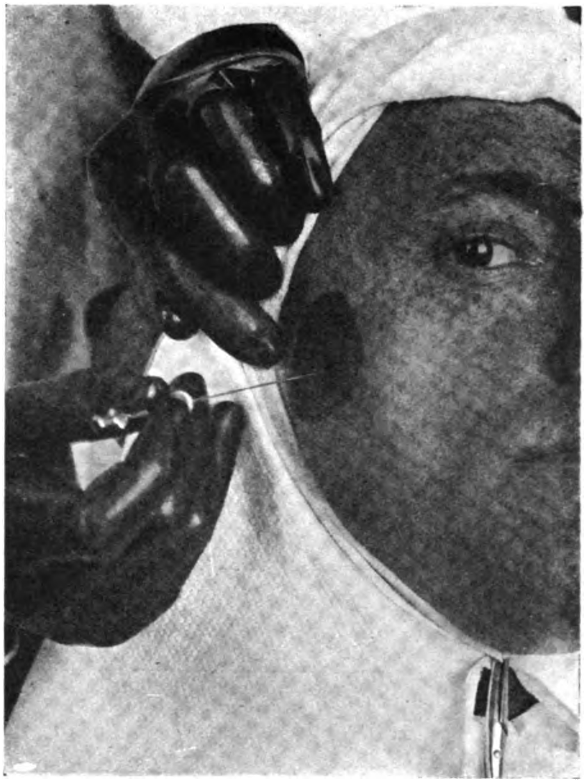

Figure 13. Shows the needle about to be inserted for the extraoral mandibular injection.

CONCLUSIONS.

Extraoral methods of anesthesia for the mouth are not original with me. Such methods have long before been described by Braun and his followers, but have never become very popular.

I hope, however, that these simplified methods presented and the fact pointed out that such methods are less dangerous than similar ones, undertaken from within the oral cavity, on account of perfect asepsis, will be found not only a great help to the oral surgeon, but a benefit to the public in general.

43 Bay State Road.

ORAL HYGIENE IN RELATION TO ANESTHESIA, ANALGESIA AND THE ANESTHETIST.*

Bion R. East, D.D.S.,
Detroit, Mich.

Oral hygiene may be defined as the science of keeping the mouth healthy. In this paper the writer proposes to define oral hygiene as any agent which may be used to prevent that condition which may arise either locally or systemically, which is the result of improper care of the mouth and teeth, either by the patient himself or herself, or due to improper, unskillful or criminally careless dental operations.

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*Read during the Joint-Session of the Interstate Association of Anesthetists and the National Dental Association at Louisville, Ky., July 26-27, 1916. From the Dental Department, Detroit Board of Health, in conjunction with the Research Laboratories of Parke, Davis & Company.

At the outset the author wishes to impress upon the members of this association that he claims no originality in any statement he may make in this paper other than that of the report of the cases presented. He simply wishes to impress upon the members of this association the importance of mouth hygiene and to show a few cases which have resulted from lack of hygienic conditions in the oral cavity. The author is going to assume that any condition which has, or may develop into, detrimental effects upon the whole body economy would lower the desirability of anesthetizing an individual. Any condition which lowers the body resistance in general certainly has a harmful effect upon a patient's toleration of an anesthetic or analgesic.

FIGURE 1.

Case No.	Condition of mouth.	Material taken from.	Bacterial findings.	Number per mg.	Virulence.
1	Good	Gingival margins	Staph. Pneumo. Spirilums	7,000,000 5,000,000 1,000,000	Low
2	Good	Gingival margins	Staph. Pneumo. Unident.	7,000,000 6,500,000 5,000,000	Low
3	Good	Gingival margins	Staph. Strep. Pneumo. Unident.	9,000,000 2,000,000 7,500,000 5,000,000	Low
4	Brushed daily Cavities Canals uptrid.	Gingival margins	Staph. Pneumo. Strep. Unident.	10,000,000 25,000,000 5,000,000 10,000,000	Fairly high
5.	Good. Blind abcess at apex of Bicuspid.	Gingival margins	Staph. Strep. Unident. Pneumo.	15,000,000 6,000,000 2,000,000 5,000,000	Low
6	Very bad Mouth never cleaned	Gingival margins	Staph. Strep. Pneumo. Unident.	20,000,000 7,000,000 15,000,000 100,000,000	Fairly high
7	Bad. Putrescent canals Never cleaned	Gingival margins	Staph. Strep. Pneumo. Unident.	15,000,000 3,000,000 30,000,000 50,000,000	High
8	Fair teeth Cleaned with handkerchief	Gingival margins	Pneumo. Staph. Strep. Unident.	6,000,000 10,000,000 8,000,000 110,000,000	Fairly low
9	Fairly clean Cavities	Gingival margins	Pneumo. Strep. Staph. Unident.	17,000,000 5,000,000 40,000,000 100,000,000	High
10	Very bad mouth Mass of decayed teeth	Gingival margins	Pneumo. Staph. Strep. Unident.	45,000,000 70.000,000 2,000,000 11,000,000	High
11	Never cleaned Fairly good	Gingival margins	Pneumo. Staph. Strep. Unident.	25,000,000 100,000,000 6.000,000 2,000,000	Very high

A search of medical and dental literature discloses an absolute lack of thought along the subject of this paper, therefore the author wishes this essay to serve simply as an introduction to what surely will prove to be an interesting field of investigation.

I wish first to call your attention to a series of tests which were made to reconfirm the fact that in a mouth receiving very little hygienic attention, one in which caries of the teeth are prevalent or other

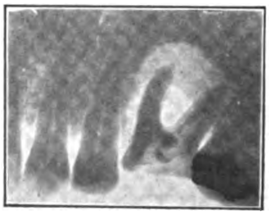
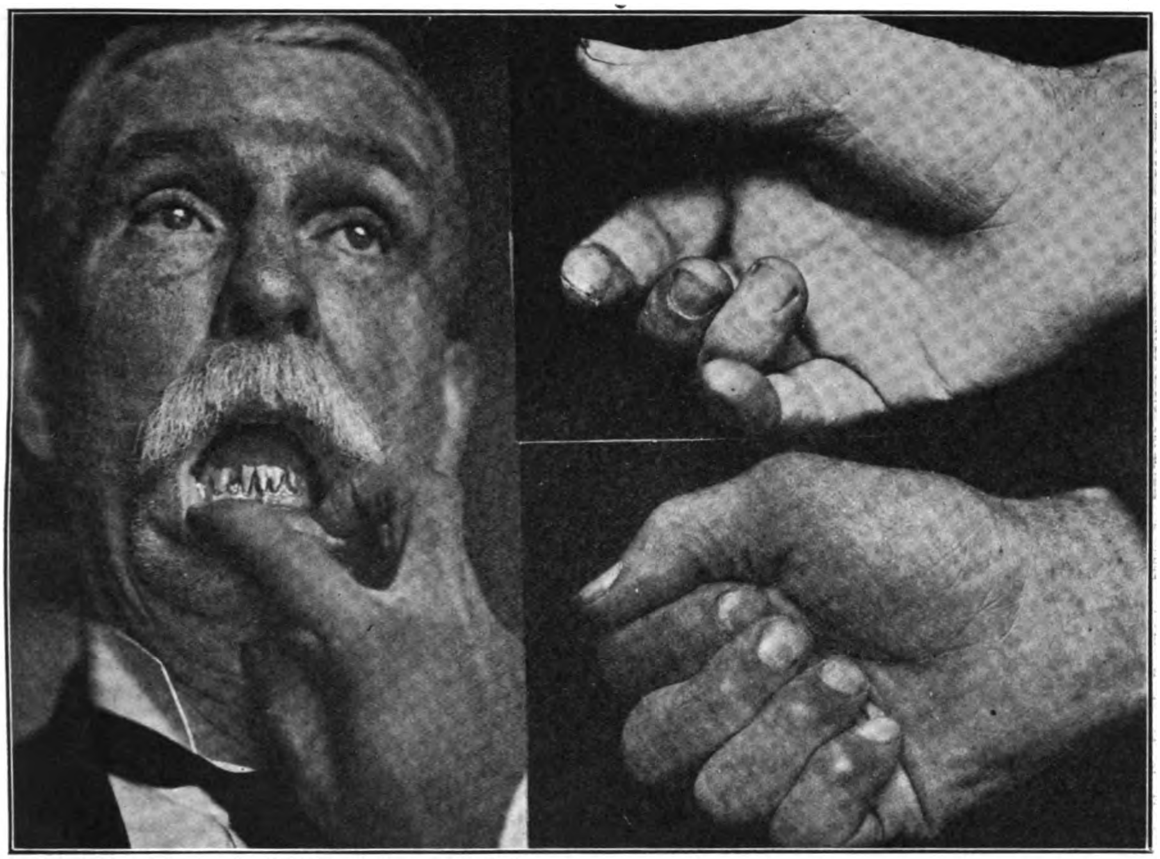


Figure 2.



Figures 3, 4 and 5.

pathological conditions present, that bacteria were more prevalent and of greater virulency (Figure 1).

An examination of these charts show the bacteria much more virulent where no care is given the mouth. The great number of pneumococci present is of the greatest interest to the anesthetists.

In case No. 10, 45,000,000 pneumococci to the milligram were found present, of very high virulence; if for any reason this patient should be given a general anesthetic he surely would be a very favorable subject to develop postoperative pneumonia, if the patient should inhale saliva containing such virulent bacteria in such numbers as is present in his oral cavity. The combination effect of shock, which certainly follows the combination of general anesthesia, and the major operation, which made it necessary to give a general anesthetic, lowers the resistance of the body. Understand that I do not say the shock which follows a general anesthetic alone. Crile has demonstrated that the resistance is increased where nitrous oxide and oxygen is used as an anesthetic and the operation performed carefully in combination with local anesthesia, but many operations are not done carefully, many are of such a nature and magnitude that the patient must suffer shock and the body resistance lowered. I think you will agree that if the patient inhaled a saliva such as subject No. 10 is the possessor of, he might develop pneumonia, and the anesthetists or the agent

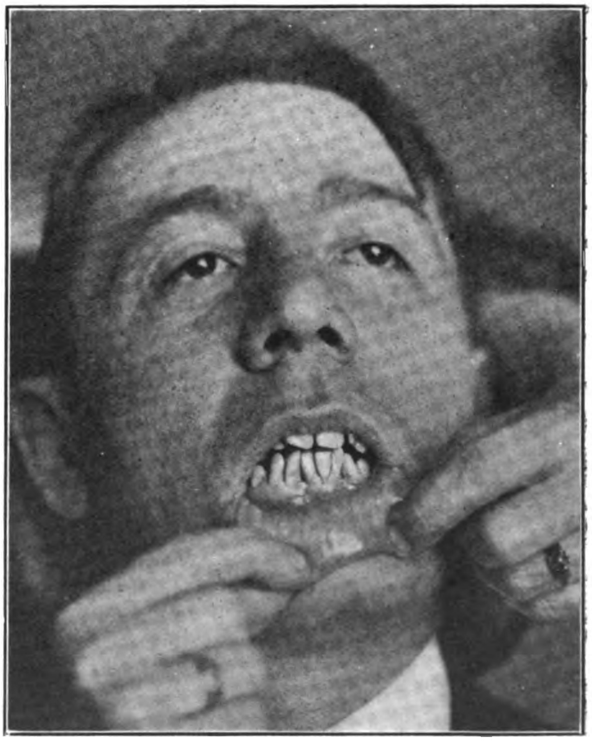
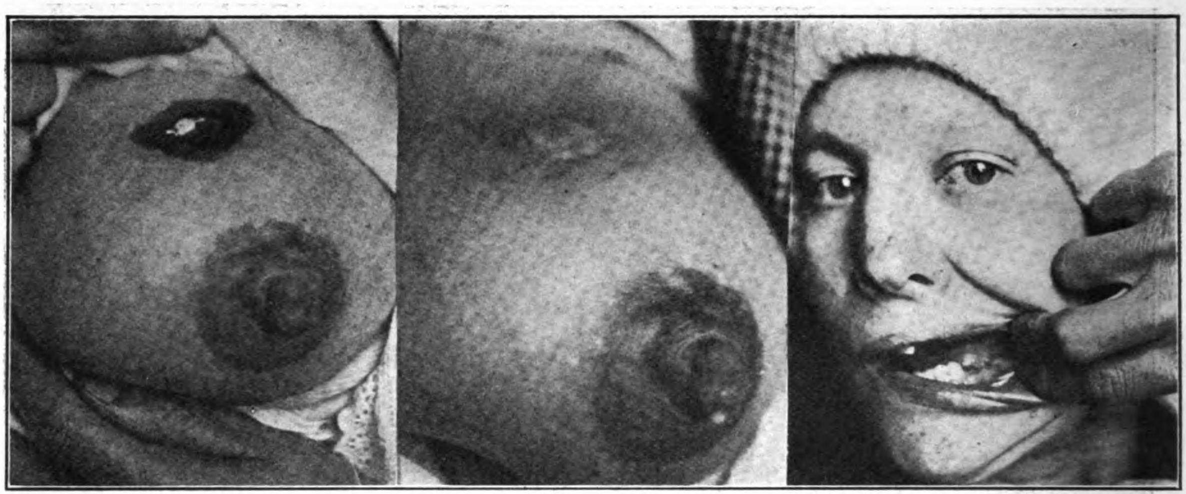


Figure 6.



Figures 7, 8 and 9.

used to anesthetize the patient receive full blame. It would be strange if it did not occur.

I am sure that if a careful examination of the mouths of patients who have contracted post-operative pneumonia were made, a high percentage of them would be found to have unhygienic conditions present, due to caries, or pyohorrhea, and that proper attention to overcome these conditions before the anesthetic was given would have eliminated the dreaded pneumonia.

Members of this association who have the opportunity to follow such cases in hospitals would find an interesting field of observation and confirm what many think to be true.

It has only been within the past year or so that the average physician could see anything in the mouth other than a tongue, when he made an oral examination. He considered the mouth simply as a convenient aperture through which he could examine the pharynx.

The teeth and gums seemed to have been considered as something entirely distinct from the whole body economy. The physicians and dentists must have labored under the impression that the teeth were created for the sole purpose of providing a suitable object upon which the dentist could exhibit, at times, his none-too-skilful workmanship.

Pyorrhoea alveolaris was dismissed as an inconvenient but harmless disease, which was only cured by wholesale extraction. Pulps were destroyed and removed from teeth, and root canals allowed to go unfilled. Abscessed teeth were treated and supposed to be cured, but almost universal use of the dental radiograph has proven that many teeth, though comfortable, have rarified areas at their apices.

Billings, Hartsell, Harris and others have proven that the infection here is the original cause of many systemic conditions, and when this focus was removed the systemic condition was relieved.

Conditions such as these must react upon the patient when anesthetized.

I am glad to state that conditions are rapidly changing; root canal filling and treatment is being

Figures 10, 11 and 12.

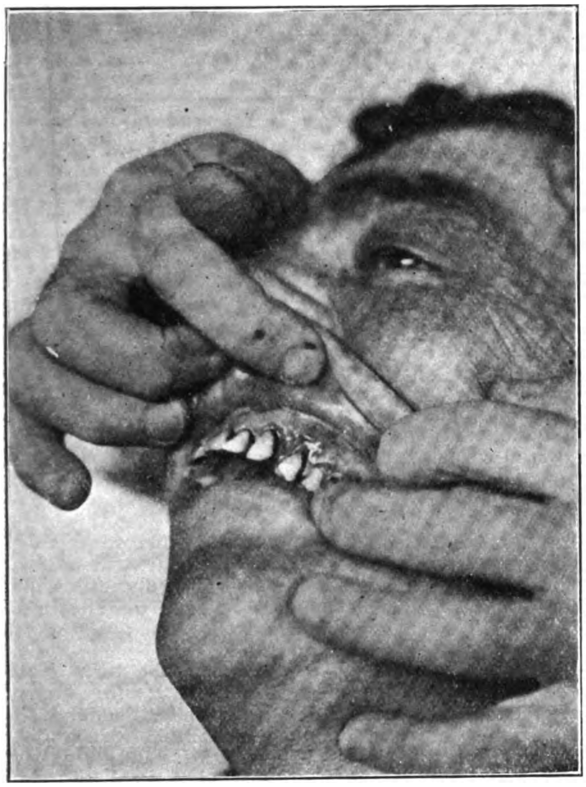


Figure 13.

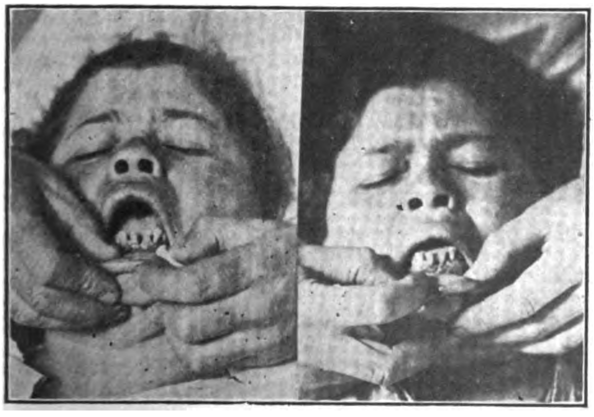
undertaken seriously. Pyorrhoea alveolaris is being treated and cured by skilful manipulation in conjunction with proper medical agents, of which Emetin does not seem to be one.

Unsanitary bridge work is being removed and is being replaced by removable, hygienic substitutes.

I wish to exhibit a few cases showing the result of mouth infection and their primary cause.

Figure 2. The pulp has been destroyed in this lower molar, but the root canals are unfilled. Infection has destroyed the peridental membrane and alveolar process. The patient suffered no little pain and the permanent loss of the tooth. This is the result of improper root canal treatment on the part of the dentist.

Figure 3. Shows a case of pyorrhoea referred to the board of health dental clinic by one of Detroit's hospital polyclinics, suffering with arthritis. Male, age 60, unable to dress or feed himself, unable to work.



Figures 14 and 15.

Figure 4. Shows the degree he could close his hand at the beginning of treatment, which consisted of a thorough scaly of the teeth, the administration of a proper dosage of vaccine, and attention given to the elimination of waste products in the intestines. After four weeks he could close his hand as in Figure 5. The patient then resumed his work and was quite normal in every way.

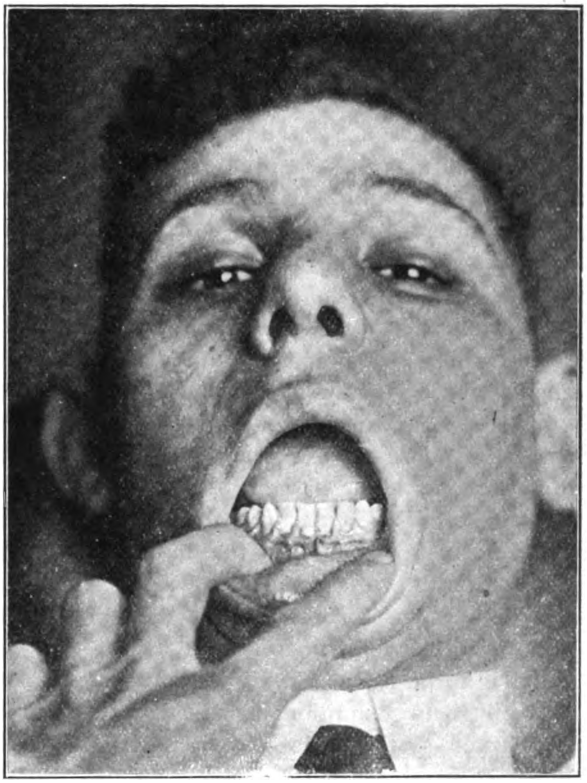


Figure 16.

Figure 6. A case from the dental department, Detroit Board of Health. Diagnosis, pyorrhoea; infection, primary strep. pyognes.; very virulent, but no rheumatism. Digestion very bad.

Treatment: Very thorough local treatment combined with emetine hypodermically and in tablet form. Before the emetine injections into the pockets, the recession shown was not present, but appeared twenty-four hours after the injection. Was it caused by emetine? Radiographs showed laterals gone, and they were extracted. The emetine treatment was now discontinued. After the emetine was entirely eliminated from the system, the teeth were then scaled and vaccines used. His digestive apparatus returned to normal; pus ceased, and he is now on the road to recovery.

Figure 7. Ulcer on the breast which defied treatment for two years. This ulcer disappeared two weeks after the mouth infections were eliminated. Elimination consisted of simply extracting all diseased teeth, and the curetment of their sockets. Figure 8, shows the abscess healed. Figure 9, shows the condition of the mouth before treatment. Figure 10, baby at the time the mouth infections were broken up. Figure 11, one week later. Figure 12, six weeks later.

Figure 13. Rheumatic, unable to turn head; diagnosis, pyorrhoea. Referred by Harper Hospital. Temperature, 101. *Treatment*: Scaling carefully and slowly done to avoid allowing the absorption of too much toxin at once. Vaccine given every five days. *Results*: Normal temperature in one week. Last traces of rheumatism gone in twenty-eight days, and no return in seven months.

Figure 14. Rheumatic, gums very painful, under treatment one month. Figure 15, taken four days after Figure 14. Joints badly swollen. The teeth very painful and resisted the usual treatment given in such cases, including vaccines. A filtered virus was then made from the pus, and an animal immunized against the virus. The complement was then obtained, diluted 1 to 1,000, and combined with normal serum. This was placed in all the pus pockets. At the same time large doses of vaccine were used. A response came in one week. Two weeks, and all soreness left. Case still under treatment.

Figure 16. Tubercular patient; tubercle bacilli found in the pockets in large numbers. Local treatment only, with complement injected in the pus sockets was used. Cessation of the flow of pus, resulting from the treatment.

What is to be learned from these cases? First: That unhygienic conditions in the mouth have a very marked systemic effect. Second: That this may affect parts quite remote from the accepted locations. Third: We can infer that any conditions as potent as some mouth infections will be detrimental to anesthesia. Fourth: That patients with systemic infections should be given the benefits of oral hygiene and vaccines before and after operations under anesthesia and analgesia.

But what relation can oral hygiene bear to the anesthetist? First: Any agent which reacts upon the patient harmfully must indirectly affect the anesthetist and his work. Second: Anesthetists, being no more immune to pathological conditions in the mouth than any other human, may at the present time, and probably are, absorbing toxins and lowering their body resistance.

Let everyone who suspects improperly filled root canals, or ill-fitting bridge work in his or her mouth, have radiographs made; and if pathological conditions are found, have them removed before it is necessary to become the victim of a brother anesthetist.

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Book Reviews

A carefully selected library is essential to a thorough knowledge of the science and practice of a specialty.

The Kinetic Drive: Its Phenomena and Control. By GEORGE W. CRILE, M.D., Professor of Surgery, Westren Reserve University. Octavo of 71 pages, illustrated. W. B. SAUNDERS COMPANY, Philadelphia and London, 1916. Cloth, $2.00 net.

This brief volume is the Wesley M. Carpenter Lecture, delivered before the New York Academy of Medicine in 1915, and is in effect an epitome of a monograph in preparation, which will offer the complete experimental evidence upon which its themes and postulates are founded.

Most anesthetists are more or less familiar with Crile's exploitation of the *kinetic drive*, especially in its relation to thyroitoxicosis, cardiovascular disease, nephritis, diabetes and operative procedures on acute and chronic extrahazardous risks, in connection with the technic of *anoci-association.*

Crile has added some further data, collected from his personal experiences and researches in the war-hospitals of France; and the text is amplified with numerous illustrations showing the cytologic analysis of shock, the stabilizing effects of sleep and nitrous oxid and the prophylactic influence of alkalinization.

Crile is a clever phrase-maker and in the term *kinetic* drive he has welded the researches of Lillie, Cannon, Henderson, Clark, Osterhaut, Fischer and Allen and himself into a comprehensive conception that enables surgeons and anesthetists to speak understandingly of a symptom-complex, the prevention and control of which has become of vital importance in safe operating.

While some of his themes and postulates are being questioned by independent research-workers, undoubtedly much of what Crile has contributed to the understanding of the kinetic drive as a factor in human mechanism, and the diseases to which it is subject, will stand as a permanent addition to the sum total of scientific knowledge.

Surgical After-Treatment. By L. R. G. CRANDON, M.D., Assistant in Surgery, Harvard Medical School, and ALBERT EHRENFRIED, M.D., Assistant in Anatomy, Harvard Medical School. *Second Edition.* Octavo of 831 pages with 264 original illustrations. W. B. SAUNDERS COMPANY, Philadelphia and London, 1914. Cloth, $6.00 net.

The co-authors term their work a manual of the conduct of surgical convalescence, but it is much more than that. While it does, in an exhaustive manner, detail the technic of surgical after-treatment for almost every known operation, it goes farther and devotes almost as much attention to collateral matters of importance.

Initially it is a stirring appeal to abandon the traditions of empiricism in favor common sense dictates based on progressive, scientific investigations. What advice is given is such as has stood the test of extended practice and satisfactory service.

Nor has the volume been written only for the house-surgeon or general practitioner. It is of far more interest to the anesthetist, since the pre-operative and post-operative care of patients coming to operation under general anesthesia, is more and more coming to be placed in the hands of the anesthetist.

The co-authors seem to have realized this trend within the profession and they have, consequently, devoted much of their book to the elaboration of surgical care and convalescence as it affects and is affected by the anesthetist and anesthesia.

The thorough treatment of such topic as preliminary and post-operative diet, posture, anesthetic nauseau and vomiting, thirst, headache, shock, coma, artificial resuscitation, oxygen and many other details of vital interest to the anesthetist, show that the surgical complications are not always the more important untoward incidents in what are termed uneventful recoveries—recoveries which patients themselves consider anything but uneventful.

(Continued on page 28)

American Journal of Surgery

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JANUARY Editorials. **1917**

THE NURSE ANESTHETIST IN KENTUCKY, MICHIGAN AND OHIO.

The profession-at-large in a number of states is gradually awakening to the fact that the nurse-anesthetist abuse is an insidious treachery within the ranks of legitimate licensed practitioners, and radical measures are being adopted to stamp out the illegal and unethical administration of anesthetics.

During the Hopkinsville Meeting of the Kentucky State Medical Association, October 26, 1916, the following Report of the Committee on Ethics was presented to and *unanimously* adopted by the House of Delegates:

> "The *esprit de corps* of the medical profession is due to the observance of medical ethics by the profession. Medical ethics stand for etiquette and fair dealing among physicians and the ethical physician does nothing to lower the high standard of the medical profession. . . . It is unprofessional for a physician to assist unqualified persons to evade legal restrictions governing the practice of medicine, and physicians should expose without fear or favor, before the proper medical or legal tribunals, corrupt or dishonest conduct of members of the profession. .
>
> *"Your Committee, in this connection, desires to call your especial attention to a violation of these principles of ethics in the employment by surgeons of nurses and others as anesthetists who are not trained in the practice of medicine. It is urged that this is a procedure under the control of the surgeon, but we submit that neither law nor usage permits surgeons to decide who shall be permitted to practice medicine. In addition few surgeons are qualified better than others of the profession in the administration of anesthetics. In order, therefore, to stop this evil now, your Committee recommends that the medical profession of Kentucky request its members not to employ other than qualified physicians as anesthetists, except in cases of emergency. In order to make this request urgent and effective, we would suggest that the profession should not refer cases to hospitals where nurses are allowed to give anesthetics and that hereafter no member who violates the law and ethics shall be considered in good standing in this Association. . . ."*

Undoubtedly this unanimous decision of the Kentucky State Medical Association will not only definitely abolish the nurse-anesthetist abuse in Kentucky, but will, of necessity, challenge the attention of the Judicial Council of the American Medical Association to the fact that even the most prominent members of the national organization may no longer dare to flaunt the employment of the nurse-anesthetist in the faces of their ethical confreres.

The State of Michigan has also aligned itself on the side of law and ethics in regard to the nurse-anesthetist. In the November issue of the Journal of the Michigan State Medical Society, Dr. F. C. Warnshuis, Sec'y-Editor and a Member of the Michigan State Medical Board, after quoting the Resolution of the Ohio State Medical Board against the nurse-anesthetist in Ohio, comments as follows on the propaganda of the Interstate Association of Anesthetists to restrict the administration of anesthesia to licensed physicians and dentists:

> *"This movement should and must receive the approval and support of the united profession. The administration of an anesthetic should never be entrusted to any but skilled individuals, trained to select the safest agent for each individual case. That a nurse, after three years of hospital training and a few months experience in the giving of anesthetics, is deemed a competent anesthetist is preposterous if not criminal. Such an individual is wholly incompetent to make a physical examination to detect renal, circulatory and respiratory defects. Neither can such a one estimate the variance from the normal that disease and surgical conditions have produced. Consequently there will be evidenced a marked inability to select the safest indicated anesthetic agent or to be alert to the precautions that must govern its administration.*
>
> *"It is, from a legal standpoint, unlawful and a violation of the Michigan Medical Act for other than registered physicians to administer anesthetics. They who violate the law are amenable to its penalties."*

It is interesting to note that the Ohio State Medical Board, following the open hearing on the nurse-anesthetist held in the Senate Chamber of the State House, Columbus, O., October 2, sustained its original Resolution withdrawing recognition of Lakeside Hospital, Cleveland, O., as an Acceptable Training School for Registered Nurses, pending the discontinuance of instruction to nurses in anesthesia and the administration of anesthesia by nurses in that institution.

Thus Georgia, Kentucky, Ohio and Michigan have split the country in twain on this problem of medical law and ethics and the decisions of their State Boards and Associations will be pivotal in the propaganda to restrict the administration of anesthetics to licensed physicians and dentists throughout the United States and Canada.—McM.

Book Reviews

(*Continued*)

In its wealth of material and almost exhaustive consideration of specific details, this volume offers the anesthetists all available information for making the operative ordeal safe and pleasant and convalescence as brief and comfortable as possible. The use of such knowledge is a wonderful advertisement to both the surgeon and the anesthetists, and the results of such treatment provocative of increased patronage.

Gould's Practitioner's Medical Dictionary. By George M. Gould, A.M., M.D. *Third Edition.* Revised and edited by R. J. E. Scott, M.A., B.C.L., M.D. XX+962 pages, illustrated. P. Blakiston's Son & Co., Philadelphia, 1916. Flexible cloth, $2.75.

This *new edition* provides a modern, up-to-date, scholarly and reliable dictionary for physicians and specialists, containing all the words and phrases generally used in medicine and the allied sciences, with their proper pronunciation, derivation and definition.

The principle feature of the revision is the inclusion of some 20,000 new words. While sufficiently comprehensive for all purposes, compactness has been secured by the employment of type just sufficiently large to be legible for casual and brief consultation, the use of thinner paper, a flexible binding and the omission of already familiar and hence unnecessary illustrations.

The definitions are based on the standard literature from authoritative sources and current terms, sanctioned by widespread usage, have been included irrespective of their philological correctness.

In its new format the anesthetist will find this well-known dictionary even more useful than before.

Applied Anatomy. By Gwilym G. Davis, M.D., M.R.C.S., L.L.D., Professor of Orthopedic Surgery, University of Pennsylvania Medical School. Octavo, X+630 pages, with 631 illustrations, many in color, by Erwin F. Faber. *Fourth Edition.* J. B. Lippincott Company, Philadelphia, 1916.

"In dealing with major operations, the successful application of local anesthesia demands patience, time and skill,—skill that can only be acquired and exercised on the human cadaver by those, who, being anatomists, can alone survey the field of operation with fluoroscopic eyes. For this reason the practice of peripheral anesthesia, especially in its neuroregional aspects, appeals most pointedly to the young, ambitious and well trained surgeon, who, fresh from the anatomic laboratory, finds here as nowhere else an immediate and practical application for a knowledge that he has acquired at the cost of long nights of vigil, labor and thought.

"In these days when exact topographic and applied anatomy are rated somewhat at a discount, it is a source of no small gratification for the young, but well-trained, man to discover that his anatomic knowledge is a living, palpable and productive asset. Not a thing to be learned solely as a matter of academic culture and soon to be forgotten, but a practical tool to be used in unlocking his most immediate technical problems. It is only through the aid of applied anatomy that regional anesthesia is what it is today. For this reason alone it deserves the encouragement and fostering care of every surgeon and every teacher who has at heart the higher welfare of its science and its art."—Rudolph Matas.

Davis' volume is a thorough, practical, comprehensive and illuminating exposition of the subject, equally valuable to the operating surgeon using local anesthesia or the teacher demonstrating its principles. While in the past applied anatomy has been almost exclusively associated with the diagnosis of surgical lesions and their proper repair, at the present time, an intimate knowledge of applied anatomy is a *sine qua non* for success in using local or conductive methods of anesthesia or analgesia in surgical operations.

The text-books on local anesthesia are rather inclined to neglect the wealth of applied anatomy that can be brought to bear upon any given surgical problem under anesthesia and analgesia and consequently the thorough student must refer back to authoritative works on the subject—among which Davis' may well be reckoned as among the best.

The book is beautifully printed and many of the pictures are done in colors, by the Fabers, who are rather exceptional anatomical artists.

Once used this work appeals to the progressive surgeon-student of regional anesthesia, as one of the most valuable supplementary volumes he could possess.

Essentials of Operative Dentistry. By W. Clyde Davis, M.D., D.D.S., Dean and Professor of Operative Dentistry and Technic, Lincoln Dental College. *Second Revised Edition.* Small octavo, 334 pages and 180 illustrations. C. V. Mosby Company, St. Louis, 1916.

This volume will undoubtedly satisfy the general practitioner of dentistry by dealing in a practical manner with the essentials of operative dentistry. The author has discreetly eliminated doubtful procedures in favor of routinely successful methods and technics.

Cavity preparation, gold and porcelain inlay receive adequate attention from the author and all steps and details of operative technic are profusely illustrated in a most illuminating manner.

Similarly other phases of operative dentistry are fully dealt with, such as gold, amalgam and cement fillings.

Perhaps the most important essentials detailed are those pertaining to local and conductive anesthesia in relation to operative procedures, especially extractions. The chapters devoted to the consideration of anesthesia are illustrated in an especially valuable manner so as to indicate the relation of the technic to the applied anatomy and the contemplated operation.

Dentists are proverbially practical and Davis' book will be found more than practical enough to interest them. The fact that the work has achieved its *second edition* so soon is conclusive evidence that it is meeting a need and satisfying it.

Essentials of Laboratory Diagnosis. By Francis Ashley Faught, M.D., Director of the Laboratory of Clinical Medicine, Medico-Chirurgical College, Philadelphia. Octavo of 449 pages, 69 illustrations and flexible cover. *Sixth Edition Revised.* F. A. Davis Company, Philadelphia, 1916. Cloth, $3.00.

The anesthetist is no longer an isolated specialist. He has become a vital factor in the surgical team and not the least important phase of his work is the preparatory investigation of the condition of patients coming to operation under anesthesia and analgesia. In this new capacity the conscientious anesthetist is in duty bound to be familiar with all the latest, approved and available methods of diagnosis, especially those essential to the laboratory.

The more competent the anesthetist is in fulfilling his obligation the more valuable will be his service to the surgeon and patient, and the more conspicuous his part in securing safety, comfort and satisfactory results.

In this connection the progressive anesthetist will find Faught's volume invaluable as a constant source of accurate and practical reference regarding the essentials of laboratory diagnosis. Now that cardiac, renal, respiratory and blood tests are concomitants of the preparatory regime, the anesthetist must be prepared to collaborate in using these safeguards in all instances wherein the least hazard to life is involved.

To those anesthetists who are interested in research in connection with their specialty this book of Faught's offers a compendium of every method of procedure calculated to give scientifically accurate data.

As a whole it is one of those handy volumes that can be constantly referred to without disappointment.

Society Proceedings

Membership in a society devoted to your specialty is an essential to success.

THE LOUISVILLE SOCIETY OF ANESTHETISTS AND UNLICENSED ADMINISTRATORS.

The Louisville Society of Anesthetists, through its Secretary, Dr. E. F. Horine, in agitating the question of the administration of anesthetics by unlicensed persons, has secured a pertinent opinion from the Attorney General of Kentucky, in which he states:

"*. . . I am firmly of the opinion that no person should be permitted to administer an anesthetic unless such person possesses the qualifications and requirements provided in the laws of this State for the practice of medicine and surgery. It may be urged that the administration of an anesthetic by some person under the immediate direction of the physician would be unobjectionable, but even if this is true, which I cannot concede, the fact nevertheless remains that a person so administering an anesthetic is engaged in the practice of medicine, and unless the person so administering the anesthetic has complied with the laws of this State for the practice of medicine, he (or she) would be acting in violation of the law and subject to the penalties therein prescribed.*"

The agitation of the question of the non-medical and unlicensed anesthetist by the Louisville Society of Anesthetists, followed the introduction of an imported nurse-anesthetist into the clinic of one of Louisville's most prominent surgeons.

In view of the opinion of the Attorney General and the Kentucky State Medical Association's action (*see Editorial*), the decision of this surgeon in respect to the continued employment of a nurse-anesthetist will be awaited with interest.

THE INTERSTATE ASSOCIATION AND UNLICENSED ANESTHETISTS.

While Georgia, Kentucky, Ohio and Michigan have aligned themselves on the side of law and ethics in the movement of the Interstate Association to limit the administration of anesthetics to licensed physicians and dentists, the menace of the nurse-anesthetist is still paramount and if anything more vicious than ever.

It is consolling to realize that such states as Indiana and Tennessee will shortly abolish this abuse, but it is deplorable to have to report that certain prominent clinics, postgraduate schools, hospitals and surgeons are sending out nurse-anesthetist into the interstate practice of medicine. Appeals have recently been received by the Secretary of the Interstate requesting the activity of the association in abolishing the nurse-anesthetist abuse in Texas and Wisconsin.

Apparently this menace will not be entirely subdued until every state medical board and every state association has declared the abuse illegal and unethical, and the Interstate Association will not stop short of such an outcome.

As an indication of just what the Interstate Association has to contend with in Pennsylvania, the following letter from Dr. J. M. Baldy, President of the Bureau of Medical Education and Licensure, is printed. This letter was in reply to a request to have the Bureau pass on the legality of the unlicensed anesthetist, and as part of a movement to secure better fees under the workmen's compensation act.

BUREAU OF MEDICAL EDUCATION AND LICENSURE.

November 2, 1916.

My dear Dr. McMechan:

I have your letter of October 27, together with the enclosure, "A Review of Some Problems in Anesthesia."

In considering my answer I want you to take clearly in view my dual personality: first, as a State officer, and second, as a medical man. In connection with this matter I would call your attention to an address I made as President of the American Gynecological Society, in the year 1908. You will find that address in the Transactions of that Society. This address dealt very largely with the question of anesthesia. I had been, before that time, and have been since, most deeply interested in this whole subject. *The condition of the administration of anesthesia and the pitiable dependency on the patient upon utterly incompetent doctors, is depicted in that address. It holds absolutely good today, and so far as I can see, as a medical man, the future is as dark as the past; at any rate within the limits of our lifetime.*

If your Society could provide a sufficiency of competent anesthetists for this country, no one would hail the fact with greater glee than would I. But you, as a body, are not a grain of sand on the seashore in fulfilling that want. If I could see the possibility of the medical hospitals of the country being able to financially employ a medical man for full-time service (that is full-time as applied to their individual requirements), both for the giving of anesthesia and the teaching of the interne, I would be inclined to adopt your position.

Leaving the professional standpoint and turning to that of the State administrator I look over your communication in vain for a single word that demonstrates that your demands are made from a humanitarian standpoint. As an administrator it is my business to primarily keep before my eyes the benefit of the 7,000,000 people in this State. In looking over your communication, I see a plea, which is dominated from beginning to end, not with humanitarian purposes, but with financial purposes for a favored few—the doctors. *As an administrator the financial interests of the doctor doesn't enter in the slightest degree into my calculations. It is none of my affair in securing competent service for the citizens of this Commonwealth, whether the doctors get anything or not, any more than it is that I look for compensation for the lawyers of the community, or for the dressmakers or storekeepers or any other business clique. I see before me in inspecting and handling the hospital situation in Pennsylvania, the exact situation I pictured in my Presidential Address. I see in those 8 years absolutely no change for the better, whatever, so far as the doctors are concerned. I see the doctors doing what they have done in the past, using anesthesia for the purposes of their own pocketbooks, and with absolutely no other interest whatever in the giving of it. I see no inclination on their part for a change, taking them as a body.* You will understand that I am not including such men as belong to your Society, but you are such a pitiable minority, that you cannot help the citizens of this commonwealth out of the situation in which they are. Now as an administrator I have found a way, which on trial has demonstrated that we can help the citizens of this Commonwealth out of that to which they have unwittingly and unknowingly submitted, since ether was discovered. The woman-anesthetist, be she nurse or otherwise, is solving the difficulty in Pennsylvania, and we are today getting a safe administration, where before we had a most dangerous one.

Now, if this assertion is true, you must admit that from a humanitarian standpoint I would be criminally culpable, if on any sentimental ground I were to consent to any change in the present situation, without having at hand a competent substitute. Show me the substitute and I am perfectly willing to cooperate in throwing the work entirely into the hands of the profession. But until I do see the competent substitute, after what we have accomplished in Pennsylvania, I am afraid I will have to abide by our present arrangements.

You may not understand the situation in Pennsylvania. Allow me to present it to you, officially, in order that your Association may have no mistaken idea as to just what we require. Our advice to the hospital is as follows: name a member of your medical or surgical staff as head of the Department of Anesthesia. Give him one or more assistants, in the shape of a full-time individual, doctor or nurse, who has been especially trained in the giving of anesthesia. Make the physician head of your Department responsible for the proper administration of the drug.

This gives the doctor full opportunity and chance to take the whole matter in his own hands, if the hospital is able to stand the expense, and he has the ambition and desire to fill the position himself. What it does is to give them the alternative that where the doctor is not available or will not make himself available, they are not left in the lurch and the people of this Commonwealth are not put at the mercy of the old system. You may say this is a half-way measure. I think myself it is and if by adopting such a measure, it works out in the long run, by evolution to the position your Association assumes, no one would be better pleased than I am.

I have tried to make my position in this matter perfectly clear, and I think you will find it exceedingly difficult to pick any serious flaw in the situation as it exists in Pennsylvania.

The matter remains open in the hands of the doctors themselves. First, to take enough interest in anesthesia to make themselves competent. Second, to bring pressure to bear on their Boards of Managers to pay a sufficient salary to compensate them for the time they give, and if with that opening they do not retain the business in their own hands, you can hardly expect that the State is going to retain the business for them.

Very sincerely yours, (Signed) J. M. BALDY.

Comment on this letter is withheld for the present, pending the action of those in higher authority in Pennsylvania. The Secretary of the Bureau's absolute refusal to present the medico-legal phase of the nurse-anesthetist to the Attorney General of Pennsylvania, is the first instance in which, in its propaganda, the Interstate has found a State Medical Board which deems itself a law unto itself.

About the time some court in Pennsylvania mulcts some employer of punitive damages on account of an anesthetic fatality in a workmen's compensation operation, when the anesthetic has been administered by a nurse, both the Bureau and the Compensation Board will have pause to think. They will at least not have the excuse of not having been warned.

This whole matter has been brought to the attention of the proper authorities in the Pennsylvania Medical Association for action. It remains to be seen whether the Association will protect the rights and privileges of its component members granted under the medical practice act.

SIX MONTHS' WORK IN ANESTHESIA.*

ALMA VEDIN, M.D.,

Anesthetist to the New York Hospital; Consulting Anesthetist to the New York Infirmary for Women and Children.

NEW YORK CITY.

The cases comprise general and gynecological surgery, as well as a small percentage of tonsils and adenoids. The routine method employed has been ether by the drop method, preceded by nitrous oxide in adults and ethyl chloride for young children. In head and neck cases, endotracheal or pharyngeal insufflation has been used, and in minor cases nitrous oxide and oxygen, or ethyl chloride. The ethyl chloride has been dropped or sprayed on the gauze covered mask, and in some cases its use has been continued as long as half an hour, always with good results. The patients have had a beautiful pink color and no mucus, and the action is very rapid, as well as the awakening. Chloroform has seldom been employed on account of the danger; a few drops have been added occasionally to deepen ether anesthesia.

Our patients as a rule suffer little from the anesthetic, many having no conscious vomiting nor nausea, and very seldom excitement or cough during induction. No preliminary medication is given. They are kept in recovery rooms adjoining the operating room until conscious.

The anesthetics are administered by the official anesthetist, the junior staff doctor, substitutes, and students, under supervision. It has been our aim to induce anesthesia as pleasantly and quickly as possible, and to keep the patient as lightly under as the operative procedure will allow, thereby reducing hemorrhage and shock; for there is no doubt that there is more oozing when the patient is completely relaxed and hence more tendency to shock.

In 656 cases where careful records have been kept there was no conscious vomiting in 334 cases, or 50.91 per cent., and 210, or 32.01 per cent., had slight vomiting, whereas 112, or 17.07 per cent. had considerable long continued or late vomiting. Seventy-seven suffered from headache and 269 from varying degrees of thirst. Forty-five complained of cough, but very few to the extent that treatment had to be instituted. Thirteen of these were coughing before the operation. These data have been obtained by closely questioning the patients, and they have seldom complained of the anesthetic.

It is generally thought that without a preliminary hypodermic injection of morphine and atropine, the patient will suffer much with mucus, but we have not found this to be the case. It is only in the exceptional cases that we have been troubled with excessive mucus, and these have not been among the cases that have later developed pneumonia. The pneumonias have been studied by Dr. Frederic Bancroft and described at length by him in discussing Doctor Whipple's paper on Postoperative Pneumonias.[1] His discussion is given below.

Ether seems to us the safest anesthetic, and its administration by the open drop method the safest and most practical method for the general hospital clinic. If attention is paid to keeping an unobstructed airway, there is no respiratory strain nor asphyxia, and the patient awakens promptly, in good condition.

Postoperative pneumonias. During the year 1915 there have been fifteen cases of pneumonia in 1,413 operations, or 1.06 per cent. Of these fifteen cases seven ended fatally; a mortality from pneumonia of 46.6 per cent., or a total mortality of 0.5 per cent. In order to study and analyze these cases, a brief résumé of the history and operations performed is given. First, the fatal cases will be considered.

Case I (appendicitis with general peritonitis). A child of fourteen years had been sick three days before operation; appendicectomy and drainage under gas and ether anesthesia; time, forty minutes. Death on third day. A right lower lobar pneumonia. In this case the pneumonia was probably a manifestation of a general septicemia with the anesthesia as the exciting agent.

Case II (acute appendicitis with general peritonitis). A child eight years old, onset six days before admission. At operation the abdomen was full of pus and the child was critically ill. She continued drainage very slowly until the fifteenth day, when she had sudden pains in the right chest, with bloody expectoration, all the clinical and physical signs of a pulmonary embolus. Following this, she developed signs of a lobar pneumonia and died on the twenty-fourth day.

Case III (typhoid appendicitis). Child eight years old, onset two weeks before admission; malaise, fever, acute right sided abdominal pain twenty-four hours before admission. Had vomited once. Lungs negative. Few marks suspicious of rose spots. Spleen palpable. Mass in right lower quadrant; extreme tenderness; moderate rigidity. White cells, 7,000. Polymorphonuclear eighty per cent., mononuclear twenty per cent. At operation a small gangrenous area over an ulcer in the jejunum. Cecum and appendix markedly indurated (evidently the mass felt upon palpation). Appendix removed, reenforcing suture over ulcer. Ethyl chloride and ether anesthesia. Time, thirty-five minutes. Pathological report showed typhoid appendicitis. Lobar pneumonia fourth day. Died eighth day.

Case IV. Man, thirty-five years old. Exploratory laparotomy for ruptured gastric ulcer with general peritonitis. Duration twenty-four hours before admission. Abdomen found full of fluid. No ulcer found on anterior surface of stomach. Patient too ill to proceed further. Drainage. Anesthesia, novocaine one per cent., and gas and oxygen after opening abdomen, time forty minutes. Patient did fairly well for a time, but drained profusely, then developed a subphrenic abscess. This was drained by the transpleural route, after having waited for thirty-six hours for adhesions of the pleura to form. He developed a suppurative pleurisy and later a pneumonia. Death was due to edema of lungs.

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*Read before the Women's Medical Association of New York City. From the Second Surgical Division of the New York Hospital, 1915, with a Report of Endotracheal Cases to Date.

[1] Read before the Surgical Section, Academy of Medicine, April 12, 1916.

Case V. Woman, aged thirty-eight years. Oophorectomy for ovarian cyst. Double salpingectomy for pyosalpinx. Gas and ether, duration forty-five minutes. Left table in good condition. Died second day with signs of lobar pneumonia. Urine negative.

Case VI (acute cholecystitis). Woman, aged thirty-eight years. Enormously fat. Cholecystostomy. Anesthesia, gas and ether changed to chloroform. Patient choked and coughed a good deal and was never thoroughly relaxed. First day signs of dullness and bronchial breathing right lower base. Died on second day.

Case VII (strangulated inguinal hernia). Man, fifty-six years old. Irreducible hernia, twenty-nine hours obstruction, vomiting, etc. Few coarse, moist rales at both bases posteriorly. Herniotomy. Gas and ether, duration thirty-five minutes. Contracted lobar pneumonia first day, died the third.

A summary of these seven cases shows three deaths following general peritonitis. Of these three cases, one was fatal at the end of the third day, one on the twenty-fourth day, of pneumonia, secondary to pulmonary embolus, and the other died of a pneumonia secondary to a suppurative pleurisy, due to a subphrenic abscess.

The other four cases, those of typhoid appendicitis, strangulated inguinal hernia, pelvic inflammatory disease, and cholecystitis, should have been avoided.

The diagnosis of the eight cases that ended in recovery were: Chronic appendicitis, 3 cases; ventral hernia, 1 case; gastrostomy for carcinoma of esophagus, 1 case; inguinal hernia and hypertrophied tonsils, 1 case; inguinal hernia, 1 case: cholelithiasis, 1 case.

Two were lobar pneumonia and six bronchial pneumonia. Onset: First day, three cases, and one each on the second, third, fourth, fifth, and eighth days. All persisted four to eight days and subsided by lysis. X-ray taken in two cases showed signs like tuberculosis.

The entire series of fifteen cases classified according to pathological lesions is as follows: Appendicitis, 5 cases; typhoid appendicitis, 1 case; inguinal hernia, 2 cases; strangulated inguinal hernia, 1 case; ventral hernia, 1 case; carcinoma of esophagus, 1 case; pelvic inflammatory disease, 1 case; peritonitis with ruptured gastric ulcer, 1 case; cholecystitis, 2 cases.

It will be noticed that every case was a laparotomy. Age: Youngest, four, eldest, sixty-two years. Six varied btween thirty-four and thirty-eight years. Time of operation: Shortest, fifteen minutes; longest, one hour. Average, thirty-six minutes.

Onset: Earliest, first day; latest, fifteenth day. Season of year; three occurred in March, three in August, one each in the other months, therefore the time of year did not seem to be a factor. Ten occurred in the cold months and five in summer.

Conclusion: 46.6 per cent. of our pneumonia cases were fatal. Three of these cases were in severe peritonitis and the pneumonias may have been of the terminal type.

The anestheisa in eleven cases was gas and ether. Bennett inhaler, followed by the drop method. Ethyl chloride and ether, 2 cases; gas and ether followed by chloroform, 1 case; local, novocaine, followed by gas and oxygen, 1, case.

The bacteriology of this series has not been studied. The study of the bacteriology in Doctor Whipple's paper has been most instructive, and will tend to clear up the disputed question of whether the postanesthetic bronchopneumonias are true bronchopneumonias or multiple infarcts. In our series we had two cases where the *x*-ray report was returned "suspicious of tuberculosis." Both cases later cleared up. It seemed probable that the shadows seen were multiple infarcts, rather than bronchopneumonia. If the same organism found in the mouth is later identified as the cause of the pulmonary infection, it will suggest that the lesion is a bronchopneumonia. We have *x*-rayed our patients that had unexplained high temperatures, provided that they were in condition to move, but have not considered it advisable to *x*-ray patients with positive physical signs.

IMPROPER CLOTHING DURING ANESTHESIA.

One of the greatest factors in the etiology of post-operative pneumonias is the operative night gown. Many of the patients entering a hospital are accustomed to sleep in heavy woolen or flannel underwear. After entering the hospital they are forced to wear these light muslin gowns split open in the back. When they are on the operating table, there is often only a couple of layers of cotton between the metal operating table and their unprotected backs. During the recovery from the anesthetic, although wrapped in blankets, they may thresh around enough again to expose their backs. There should be undershirts of different weights provided by the hospital, so that the body heat of a patient may be protected until he is well out of the influence of the anesthetic.

ENDOTRACHEAL CASES 115.

As this is a comparatively modern method of anesthesia, being first used on the human being by Elsberg, in 1910, it seems important that all cases should be recorded in order that a correct estimate may be formed of the safety of the method as well as its special indications.

The apparatus used in the New York Hospital is the Janeway, which is kept on a table specially made for it, with a closed compartment below, containing all the necessary appliances. In this way the whole apparatus can be wheeled from room to room. It has the advantage over some similar machines, that it runs without noise and so does not disturb the operator.

The Jackson direct laryngoscope and silk woven catheters are used. The patient is placed in position for operation and a small sandbag is placed under the shoulders fully to extend the head, allowing the catheter to be placed while the patient is being painted and draped; thereby time is saved. A little more time is required than with the inhalation method, however, as the patient has to be deeply anesthetized in order to insure success in intubation, and this is one reason why we have not used the method more frequently. In the beginning we used it in all kinds of cases to try out the apparatus and gain skill in intubation.

This series of 115 cases, therefore, represents a great variety of general surgical operations: for repair of hernia, 22; 11 for cervical adenitis, 12 for appendicitis, 4 for gallstones, 15 other laparotomies, 14 thyroidectomies, 2 brain cases, 2 laryngectomies, 3 resections of the jaw, 4 thoracotomies, 1 resection of cervial rib, 1 resection of portion of sternum, 4 fracture cases, 1 prostatectomy, etc. They were most of them fairly long operations, 87 lasting half an hour or more. Of these, 46 lasted one hour or more, 4 being two and one half hours and over. The longest operations for an old fracture of both bones of forearm near the elbow—lasted two hours and fifty-five minutes, with the patient in good condition at the end. Only three cases lasted ten minutes or less.

Preliminary medication was given in only seven cases. Relaxation was with one or two exceptions perfect, with a lighter degree of anesthesia than with inhalation. There was very little vomiting and no throat irritation.

In a few cases, notably some goitre cases, there was a good deal of mucous secretion during anesthesia, but no aftereffects were noted as a result. One patient undergoing amputation of the tongue acquired pneumonia and died on the third day; and one patient with much hemorrhage, undergoing a tedious resection of the superior maxilla for carcinoma, died from shock within a few hours of the operation.

We consider the method especially indicated for intrathoracic work and operations upon the head and neck, where it is inconvenient for the surgeon and anesthetist to occupy the same field. In thyroidectomies it is particularly useful, because respiration is not interfered with when the trachea is pulled upon, nor can the trachea be compressed while the catheter is *in situ;* also for cases of extensive cervical adenitis where there is apt to be more or less disturbance with breathing.

It has been stated that pharngeal insufflation is just as good and much easier of accomplishment, but, while it may be satisfactory in the majority of cases, it is not always absolutely smooth, as the catheters may become clogged with mucous and blood, if the operation is in the mouth, and the air-way may not be entirely free; whereas in the endotracheal method we know where the ether vapor is going all the time; and the method certainly has a place in thoracic surgery, brain surgery, and for lengthy operations about the head and neck.

224 East Fifteenth Street.

Quarterly Index

Of the Current Literature of Anesthesia and Analgesia.

EDITOR'S NOTE: Authors of pertinent articles, who desire to have them indexed and abstracted, are cordially invited to send copies of the journals containing their contributions, direct to the editor, immediately on publication. Also the receipt of reprints for filing and reference will be duly appreciated.

Accidents During the Following Anesthesia. Isabella C. Herb, Chicago. American Journal of Surgery, September, 1916.

Alkaloidal Adjuvants in Anesthesia. R. C. Coburn, New York. Medical Record, September 9, 1916.

Anesthesia. Paluel J. Flagg. New York Medical Journal, October 28, 1916.

Anesthesia in the Curriculum, the Clinic and Private Practice. Hugh W. MacMillan, Cincinnati. Dental Summary, November, 1916.

Anesthesia, General Principles for. D. C. Collyer. Siglio Medico, July 15, 1916.

Anesthesia Reviewed. James T. Gwathmey. New York Medical Journal, October 28 and November 3, 1916.

Anesthesia by Selection. H. C. Anderson, Kansas City. Missouri State Medical Association Journal, October 1916.

Anesthetics, Newer in Labor. G. C. Mosher, Kansas City. Missouri State Medical Association Journal, October, 1916.

Anoci-Association, Application of, to Obstetrics. C. L. Hoag, San Francisco. Surgery, Gynecology and Obstetrics, October, 1916.

Bodily Changes Under Anesthesia. F. C. Mann, Rochester. Dental Summary, October, 1916.

Chloroform as a General Anesthetic in Nasopharyngeal Surgery. W. H. Nardin, Anderson, S. C. Annals of Otology, Rhinology and Laryngology, June, 1916.

Chloroform Poisoning, Experimental, Protective Action of High Carbohydrate Diet and Oxygen on Liver Cells in, with Possible Application in Pre-Eclamptic Toxemia. R. T. Lavake, Minneapolis. American Journal of Obstetrics. September, 1916.

Chloroform in Status Epilepticus. Leigh F. Robinson, Raleigh, N. C. Journal of the American Medical Association, November 18, 1916.

Conductive Anesthesia, Extraoral Methods of. Kurt H. Thoma, Boston. Dental Summary, November, 1916.

Death After Nitrous Oxid-Oxygen and Spinal Anesthesia. W. E. Robinson. British Medical Journal, August 26, 1916.

Epidural, Caudal or Sacral Anesthesia. C. W. Allen. New Orleans Medical and Surgical Journal, October, 1916.

Ether and Chloroform Anesthesia. R. E. Humphreys. The Practitioner, August, 1916.

Ether, Administration of. J. W. Kennedy, Philadelphia. Medical Council, September, 1916.

Ether Anesthesia, Influence on the Amino Acids of Blood Serum. E. L. Ross, Chicago. Journal of Biological Chemistry, October, 1916.

Ether-Oil Colonic Anesthesia in Opthalmic Operations. T. L. Dagg, Chicago. Opthalmic Record, October, 1916.

High Pressure Anesthesia. Raymond E. Ingalls, Ft. Bliss, Texas. Dental Cosmos, October, 1916.

Local Anesthesia. A. Jacoby, Dallas. Texas State Medical Journal, August, 1916.

Local Anesthesia. L. E. Daugherty, St. Paul. Journal-Lancet, September 15, 1916.

Local Anesthesia. W. I. Hume, Louisville. Kentucky Medical Journal, October, 1916.

Local Anesthesia in Herniotomy. D. Kelly. Medical Journal of Australia, September 16, 1916.

Local Anesthesia for Operations on the Chest. Couteaud and Bellot. Bulletin de l'Academie de Medicine, July 18, 1916.

Local Anesthesia for Reduction of Luxations. T. Kalima. Finska Lakäresallskapets Handlinger, lviii, No. 1.

Local Anesthesia in Minor Surgery. C. W. McElhaney, Greenville. Pennsylvania Medical Journal, September, 1916.

Local Anesthesia for Operations on the Skull. J. Quenu. Paris Medical, September 9, 1916.

Local Anesthesia in Abdominal Surgery. L. W. Grove, Tuscaloosa. Southern Medical Journal, October, 1916.

Local Anesthesia; Partial Thyroidectomy with Scopolamin-Morphin and. F. H. Lahey. Boston Medical and Surgical Journal, October 19, 1916.

Local Anesthesia, Operations Under. F. Wieland. Cronica Medica, xxxiii, No. 4.

Local Anesthesia, Rectal Operations Under. J. F. Saphir. New York Medical Journal, September 30, 1916.

Local Anesthesia (Narco) in Surgical Work. R. E. Farr, Minneapolis. Journal-Lancet, August 15, 1916.

Local Anesthesia, Operations on the Kidney and Ureter Under. C. W. Allen. New Orleans Medical and Surgical Journal, November, 1916.

Magnesium Sulphate Anesthesia in Human Beings by Intravenous Injection. Charles H. Peck and S. J. Meltzer, New York. Journal of the American Medical Association, October 14, 1916.

Nerve Blocking and Regional Anesthesia, Increasing Usefulness of. A. O. Singleton, Galveston. Texas State Medical Journal, August, 1916.

Nitrous Oxid-Oxygen Anesthesia and Its Limitations. J. W. Seybold, Denver. Colorado Medicine, August, 1916.

Nitrous Oxid, Pharmacological Action of. D. E. Jackson, St. Louis. Journal of Laboratory and Clinical Medicine, June, 1916.

Nitrous Oxid-Oxygen Anesthesia and Analgesia in Obstetrics. Elmer L. Henderson, Louisville. American Journal of Surgery, November, 1916.

Novocain. H. F. Koontz, Pittsburgh. Dental Summary, September, 1916.

Painless Childbirth, Morphin-Hyoscin Method of. F. W. N. Hultain and B. H. Swift. British Medical Journal, October 14, 1916.

Painless Labor. J. Clifton Edgar, New York. Journal of the American Medical Association, September 2, 1916.

Paravertebral Anesthesia; Principles and Technic of. P. W. Siegel. Zeitschrifft für Geburtshülfe und Gynekologie, lxxix, No. 1.

Rectal Anesthesia. W. M. Johnson. New York Medical Journal, October 28, 1916.

Twilight Sleep. J. E. Wilson, Butler. Kentucky Medical Journal, September, 1916.

TO THE READERS OF THE SUPPLEMENT

The American Year Book *of* Anesthesia *and* Analgesia.

While the Anesthesia Supplement covers the Transactions of the various associations of anesthetists, the American Year Book of Anesthesia and Analgesia will enable the surgeon, specialist, dentist, anesthetist and research worker to review all the current advances in the science and practice of these subjects, as they interest him individually.

Among the contributors are: R. S. Lillie, Theodore Casto, F. C. Mann, W. D. Gatch, G. W. Crile, E. I. McKesson, Y. Henderson, A. H. Miller, A. G. Levy, R. H. Ferguson, W. P. Burdick, J. Jarvis, J. J. Hogan, J. T. Gwathmey, A. H. Warner, R. A. Rice, A. E. Guedel, J. O. Polak, F. H. McMechan, E. S. Barber, W. H. DeFord, R. H. Riethmüller, Kurt Thoma, C. W Allen, L. . Hirschman, C. T. Souther, W. Harris, A. E. Hertzler, W. T. Porter and G. G. Smitn.—*Editor*.

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RECURRENCE OF GALLSTONES.*

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Every experienced surgeon finds himself confronted with the question of recurrence of symptoms requiring secondary intervention after operation for the relief of gall-bladder or biliary conditions. As in other questions, perhaps a free exchange of views may help toward the solution of this vexed problem.

About 4.07 per cent. of the cases of biliary affections operated upon by me at the German Hospital of Philadelphia were secondary cases, *i.e.*, such as had had one, or two or even more previous operations performed by me or by other surgeons for gallstones or other disorders of the bile passages in periods varying from seven months to seventeen years; the greater number (60 per cent.) required re-operation within one year after the primary intervention.

In a recent publication (*Illinois Medical Journal*, June, 1916), I presented the results of a study of 1031 operations performed in the German Hospital by me from January, 1910, to January, 1916, with a mortality of 7.18 per cent. and 42 recurrent cases in the series. More recent figures (January, 1916, to November 1, 1916) give about the same percentage of recurrent cases, but a somewhat higher percentage of operative deaths. [In 152 operations there were 15 deaths; and eight patients who had had one or two (one case) previous operations upon the gall bladder. The one patient having a history of two previous operations was also the one who had had the longest interval between operations; the first, a cholecystostomy, having been done seventeen years, and the second, a cholecystduodenostomy, fifteen years before the present operation.] In addition to the above 1183 operations, I performed 642 operations in the years 1897 to 1909 inclusive, making a total of 1825 operations in my German Hospital service. This does not include the operations done in St. Mary's, St. Agnes, the Philadelphia and University Hospitals, which would make my total considerably over 2,000.

The most common cause of recurrence after cholecystostomy in the combined series was stone or stones in the gall bladder (12 cases); adhesions (8 cases), stone or stones in the common duct (6 cases) being next in order of frequency. In the earlier series four of the patients required re-operation after a cholecystectomy, two for stricture of the pancreatic portion of the common duct or the duodenal orifice and one each for stone in the common duct and post-operative duodenal fistula. All the recurrent cases in the later series were after primary cholecystostomy. This would make it appear that cholecystectomy, though the more serious operation, reduces the risk of future gallstone troubles. As I have stated elsewhere, however, under good conditions the mortality figures of the two operations do not greatly differ.

The failure to remove all the gallstones at the primary operation is the most potent cause of recurrence of symptoms. This adds emphasis to the arguments we surgeons are continually bringing forth of the importance of early operation. Kehr, perhaps the greatest German authority on surgery of the gall bladder, does not hesitate to lay much of the blame for recurrent gallstones on the medical man. He points out that in long standing cases the gall ducts become dilated and stones are apt to lodge in the recesses, so that they cannot always be removed or even detected at operation, and they thus give rise to renewed attacks of cholelithiasis. Operation, says Kehr, in cases in which inflammation is limited to the gall bladder, may be postponed for a few weeks or months, but in cholangitis it should be resorted to after a second attack before the ducts have had a chance to dilate. There are of course operators, he says, who fairly court recurrence by their method of operation, but the surgeon who gets a chance to perform an early cholecystectomy and *drains* the widely incised choledochus, is only rarely confronted with a recurrent case. In the matter of free and prolonged drainage of the gall bladder or the common duct, I heartily agree with Kehr. I regard it as the best means of overcoming recurrence and I make it a practice to use large sized tubes and allow them to remain *in situ* until they practically drop out.

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* Read before the Harlem Medical Association, New York City, December 6th, 1916.

It is not always easy to determine whether these recurrent stones were overlooked at operation or whether they had actually formed again after operation. The impression, however, is strong that re-formation had taken place inasmuch as the number of stones in many of the cases ranged from five or six to several hundred, which could hardly have escaped detection. On the other hand, it is not always possible to clear the two primary branches of the hepatic duct; again, in the attempt to remove a stone or stones from the hepatic duct, one or more may be displaced upward beyond the reach of the surgeon and thus produce common duct obstruction, which in turn requires re-operation. I have had cases in which I have removed muddy, granular material from the gall bladder and have the patients return for obstruction of the common duct. I have also seen cases which required several operations before a permanent cure was established. Here also complete drainage is essential for a cure, and we should not hesitate to open the common or the hepatic duct to secure it.

Other cases in the series showed renewed infection of the gall bladder, or of the bile ducts, or failure to have removed all the infection at the primary operation, as indicated by the presence of acute or chronic cholecystitis, chronic cholangitis, biliary cirrhosis, and pancreatitis at the subsequent intervention. Some of the less common causes of recurrence of symptoms were obstruction at the papilla of Vater, biliary fistulas, internal and external, and interstitial pancreatitis and pancreatic lymphangitis.

Frequently associated with numerous minute stones in the common, the hepatic and the smaller bile ducts, with occlusion of the papilla of Vater, is biliary cirrhosis. For the relief of this condition, which I have frequently met with, only prolonged gall bladder or common duct drainage will suffice to bring about a permanent improvement or cure. That cases of this type can be given as good a chance for improvement or cure by medical treatment, including that given at the various famous springs, to my mind is preposterous. Anyone who has seen and studied the operative findings cannot but agree with me **in toto** in this statement. The medical man, who has seen in a half sort of way, one such case naturally may not be convinced. This reminds me of a remark made by the late Dr. McBurney in discussing a paper on appendicitis, when he said, "Lord deliver me from the man who has had 'a case'." Those of my onlookers who have seen me upon many occasions delve into the primary hepatic ducts and scoop out muddy, sand-laden material, have, with me, concluded that recurrence would surely occur. How any medicine could clear the bile ducts of this material I cannot see, yet these cases are frequently subjected to prolonged medical treatment.

It is well known that the chronic infections beget gallstones while the acute infections, destructive lesions. Chronic cholangitis must be reckoned with in the study of the causes of recurrence of symptoms. Citation of the following case will illustrate this point:

Mrs. ——— at 45 yrs. Recurring attacks of biliary colic with jaundice covering a period of one year, during which time she was treated medically. When I was asked to see her I found her feverish, with accelerated pulse, profoundly jaundiced, suffering constant pain, with enlarged liver and a painful and palpable gall-bladder. I advised immediate operation, which showed an inflamed gallbladder distended with stones and the common and hepatic ducts filled with stones. Gallbladder removed, common duct opened and fifteen stones removed from it and the hepatic duct. With a small scoop many very small stones were removed from the primary hepatic ducts; the papilla of Vater was strictured, necessitating dilatation with graduated probes. Operation consisted of drainage of the common duct. Culture of the bile showed colon bacillus.

The patient made a stormy recovery. Drain removed in eight weeks. Remained well for one year, when she was again the subject of practically the same symptoms as before operation. Second operation showed numerous small stones in the common and hepatic ducts. Again the ducts cleared as well as could be done and common duct drainage instituted. Again recovery, remaining well for a little over a year, when she suffered from an attack of cholangitis that has improved but has not entirely cleared up.

It is too plain what the future of this patient will be. I have advised further operation and drainage of the common duct for an indefinite period. I have one patient wearing a T-tube now over three years, who is perfectly well and will not listen to removal of the tube, having had two previous operations. I have a number of patients wearing these tubes upon whom I have performed the second or third operation; all of the patients are doing their work as they did before being attacked. The majority of the patients are poor women, housewives, and able to attend to their household duties. In this class of cases where the ballbladder can be left I consider drainage by way of the gallbladder the best and safest method.

I cite these cases as one of the several causes of gallstone formation. Minute stones imbedded in the mucosa of the gall bladder can be removed only by taking out the gall bladder; this may be unfortunate from the standpoint of the future of the patient.

1916 Gall bladder Operations.

	Number of operations	Died.
	152	15
Recurrences	8	1

Type of operations.

		Died
Cholecystectomy	93	4
Cholecystectomy & dochostomy	31	6
Cholecystectomy & cystostomy	20	3
Cholecystectomy, cystostomy & dochostomy	2	1
Cholecystectomy, cystostomy, dochostomy & pancreatostomy	1	
Choledochostomy	4	1
Cholecyst-duodenostomy	1	
	152	15

Recurrences after primary Cholecystostomy.

Causes.

Stone in Gall bladder	2
Stone or stones in common duct	1
Adhesions	4
Dilatation of common duct	1
	8
Chronic Pancreatitis	10
Pancreatic lymphangitis	4

In considering the causes of recurrence of gallstones we must necessarily revert to the primary causes of gallstone formation. Although Aschoff and Bacmeister have demonstrated the aseptic formation of the radial cholesterine stones in the gall bladder, they at the same time show that all other gallstones, the complex ones and the cholesterine-pigmented calcium stones, owe their origin to infection and obstruction. To my mind every gallstone is, in the words of Moynihan "a tombstone erected to the memory of the bacterium which lies dead within," and in the words of our lamented colleague, John B. Murphy, an infection sequence. Murphy further states that the cholesterine, which forms 98 per cent. of all gallstones, is the product of dead epithelial cells lining the gall bladder, and the stones by their presence in a more or less infected zone cause a continual deposit of cholesterine, which thus continually increases the number of stones. "until finally, there is the arrest of the micro-organism of a more virulent type, which starts suppuration in the gall bladder." This agrees entirely with the autopsy *in vivo,* which finally is the strongest argument. The internist and the gastro-enterologist form their conclusions from the outside plus laboratory findings, which make their results more or less uncertain. Were it not for the thickness of the abdominal wall between their eyes and the lesions they would be as wise as the surgeon. The infection when distributed over a great area of mucous surface will result in a large number of gallstones, for "as ye sow so shall ye reap."

We all know that infection is carried to the gall bladder in various ways—the portal circulation, the common duct, the lymphatics, the systemic circulation, and by juxtaposition. The selective action of certain virulent bacteria from a distant focus, for example, for the appendix, has been brilliantly demonstrated by Rosenow. My experience, extending over a number of years and comprising practically twelve hundred operations in the last six years for affections of the biliary passages, convinces me that the appendix, in turn, is the focus of infection for nearly all upper abdominal diseases, the gall bladder affections, gastric and duodenal ulcer, pancreatitis, etc. It is hardly necessary for me to dwell on the importance of early removal of even a slightly troublesome appendix in order to avoid future trouble. Nor need I do more than point out that the destructive possibilities of appendiceal infection have no limitations and this may practically be said of infection of the bile passages. From the confusion still reigning with regard to the etiology of malignancy, we are able to gather at least this, that carcinoma is the result of irritation. Ergo, remove the irritation. The fact, also, that 85 to 95 per cent. of primary, and only 15 to 16 per cent. of secondary, carcinomas of the gall bladder are associated with gallstones indicates that gallstones are the cause and not the result of carcinomatous degeneration (Kehr),—another argument that speaks for itself. The further pernicious results of neglected gallstones are seen in myocarditis and kidney degeneration (the two most important factors, in my opinion, in the postoperative prognosis of these cases), as well as in degeneration of the bloodvessels, diabetes, hematogenous infection, etc.

Whether we can avoid the formation and the recurrence of gallstones by a cholesterine-free diet, as recently suggested by Gerster, remains to be seen. As for the practice of sending this class of patients to the various springs for treatment—this appears to me very much like the repentant attitude of the young woman about to undergo an operation, let us say, for gallstones. Before being taken to the etherizing room she turned to her husband, saying, "My dear, if I have done anything to vex or offend you, and I know I have, I want you to forgive me," and in the next breath she added, "but if I come out of this all right, I'll do it again, I promise you." These patients may come out of their trouble all right for a while, but they're sure to have it again, sooner or later.

Disease of the biliary passages is essentially surgical and not medical, and the most common preventable cause of recurrences is late operation. Until this fact has impressed itself indelibly on the physician as well as on the laymen, we cannot expect to improve our percentage of complete cures of gall bladder and associated diseases.

SOME OBSERVATIONS ON THE SURGICAL TREATMENT OF GASTRIC AND DUODENAL ULCER.*

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Since the surgery of ulcer of the stomach and duodenum has reached an assured position in the surgical mind, and since thousands of cases of ulcer have been operated upon and observed for sufficient time to determine results, it would seem that the technical features of this work or at least the surgical principles upon which it is based should have been worked out so that there would be practical unanimity of surgical opinion with regard to them. There is still enough variation, however, to prove confusing even to the surgeon trying to get at the heart of the matter, and certainly enough variation in theory, in practice, and in results to justify the doubts that many internists still entertain as to the propriety of ulcer surgery.

Surgical poise is difficult to attain without wide experience, for most of us follow the lead of some one of authoritative position on medical and surgical questions. We do not even take the trouble to go to the bottom of that one authority's opinion. We grasp a few superficial facts, apply them in practice, or see some one else with equally superficial knowledge apply them, and are often left to wonder why we do not get results. This superficial grasp is particularly apt to result when opinions are based upon observation at the big clinics. Epigrammatic statements made by operators whose minds are, or should be, concentrated upon the technical details of the operations they are performing, or about to perform, hardly give comprehensive views of such broad subjects as that of ulcer of the stomach and duodenum, and should the statements be comprehensive few minds can retain, coordinate and judge the many facts or theories included.

The man with limited opportunities for observation in his own practice, and who must perforce base his opinions largely upon the work of others, should always approach the study of such work in the attitude of criticism, and should let no overwhelming series of cases, though they number thousands, overawe his intelligence, and make him accept as facts what may be the mistaken conclusions of a hypnotizing and self-hypnotized enthusiast. It is only by preserving this attitude of criticism, and by studying and comparing the work of many who have had wide experience, that the surgeon with scant resources in the way of clinical material can perfect his judgment sufficiently early to do justice to himself and his patients.

It is natural and perhaps proper, when authorities differ, to follow those whose plans of treatment carry the least surgical risk to patients. Operative recoveries with more or less temporary relief of symptoms have distinct advantages over deaths following complete surgery.

I know no more difficult subject upon which to preserve one's equilibrium than this one of ulcer of the stomach and duodenum. The literature of ulcer of the stomach and duodenum offers great justification to the man who would see in it a condition easily cured by simple and safe surgery. Both text-book and journal authority can be found for this view, but only a little experience is apt to show that there is a somber lining to this rosy-tinted cloud.

The chance for cure of ulcer of the stomach by removal of the diseased area is limited only by the technical difficulties of the situation. This is fact and will hardly be disputed by any one. The cure of ulcer by any less direct method, and the prevention of recurrence, can be assured only by procedures based upon a knowledge of the causation of ulcer or upon an approximately correct guess as to causation.

In these facts lie the kernel of this question of the surgical treatment of ulcer of the stomach and duodenum. Differences of opinion among surgeons are mainly as to the probability of cure by indirect surgery, so to speak. The question is really whether gastro-jejunostomy alone is sufficient or whether something more radical, and with greater operative risk, must be done.

Gastro-jejunostomy is the established indirect surgical method of treating ulcer (though gastroduodenostomy still gets honorable mention, and jejunostomy has its field of application), and it has been perfected until it is simple of technic and has an almost negligible mortality in skilled hands.

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* Read before the Nashville Academy of Medicine, September 19, 1916.

Direct surgery of stomach ulcer varies from infolding or excision of a small ulcer to partial gastrectomy, the procedure adopted depending on the size of the ulcer and its location. Direct treatment of duodenal ulcer means excision or, what is the same thing if done properly, infolding of the ulcer. Gastro-jejunostomy must often be, and in other cases preferably should be, done, in addition to the direct treatment of ulcers both of the stomach and the duodenum.

Closure of the pylorus is an indirect measure in ulcer of the duodenum, and it has the advantage of being direct to the extent of relieving the first portion of the duodenum of any functional activity, and from all contact with food or acid secretion. Ulcer must be caused by something connected with the digestive processes, but no blame has yet been attached to the secretion of the duodenal glands or to the bile and pancreatic juice. Exclusion of the duodenum, then, must be protective against the formation of ulcer, though it might fail to cure an ulcerative process already inaugurated.

Gastro-jejunostomy, which is used alone as the indirect method of treatment, exerts its influence by allowing either the exit of stomach contents or the entrance of bile and pancreatic juices. Its value for the latter purpose is problematical and the quantity of secretion entering the stomach is variable, being beyond control by any of the ordinary technics for making the stoma. When of decent size and properly located it will perform the first function whenever there is pyloric occlusion, spasmodic or organic, as has been proved to the satisfaction of everybody under many different conditions. There has never been any complaint of unsatisfactory function by a stoma made to take the place of an occluded pylorus. It is equally certain that a stoma is little used by the stomach for emptying itself so long as the pylorus is normal or even approximately so, that is to say, clear of obstruction, either spasmodic or organic.

A stoma made in the presence of a normally functionating pylorus, unless very large, is not used by the stomach, and in the presence of a spasmodic strictures it destroys its own usefulness to whatever extent it relieves the spasm.

These are established facts, and no one will dispute them, though some seem to think they may be ignored in the treatment of ulcer, especially ulcer of the duodenum. Paterson, for instance, says that it makes no difference which way the food goes, that gastro-enterostomy is a "physiological operation" and reduces the acidity of the stomach contents 30% by diminution of the total chlorides secreted, by the entrance of bile and pancreatic juice into the stomach, by the removal of spasmodic stenosis in some ulcers, and by the early stimulation of the pancreatic secretion through the presence of acid in the jejunum with compensatory fall of the gastric secretion.

Paterson and Kocher are the leading advocates of gastro-enterostomy pure and simple in the treatment of all gastric and duodenal ulcers. They are consistent in their practice throughout, but the evidence against the propriety of others following their lead is too clear and too extensive to be ignored.

W. J. Mayo closely follows Paterson on duodenal ulcers and on pyloric stomach ulcers, but finds it necessary to cauterize or resect ulcers of the rest of the stomach. Evidently the gastro-enterostomy is only "physiological" in his experience in those ulcers lying distal to the stoma. Mayo, so far as I can find, does not discuss the action of the stoma. He gets results, and seems to attribute the lack of success in others to ignorance or poor technic.

Moynihan says that in duodenal ulcer in order to get permanent results from gastro-enterostomy the ulcer must be obstructive or the surgeon must produce obstruction. He recommends Rodman's operation in pyloric and antral ulcers unless *obviously benign stricture is present.* He advises resection of ulcers of the stomach proximal to this area, plus gastro-enterostomy, but he does not advise any occlusive procedure to make his stoma permanently effective. This is strange in view of his statement about gastro-enterostomy for duodenal ulcer.

Out of the abundance of my inexperience I have learned that a surgeon can not get results from surgery that appears illogical to him. That illogical surgery will get results for the man to whom it appears logical must be true to some extent, for there are many analogous circumstances in life.

This may explain the fact that gastro-jejunostomy by itself has been disappointing to me in both gastric and duodenal ulcers unless there has been distinct organic stricture in the pyloric region. For some years I have not stopped without doing something definite to the ulcer itself except in two cases of duodenal ulcers with such extensive adhesions, and with patients in such serious condition from hemorrhage that I did not have the courage to do more than gastro-jejunostomy, and while both these patients were benefited, they both had recurrence of digestive symptoms.

For the last two years my practice has been to perform gastro-jejunostomy for duodenal ulcers, and to occlude the pylorus by submuscular resection of the mucous and submucous coats, resecting the ulcer at the same time if possible.

In gastric ulcer I resect the involved portion of the stomach. This resection is done with separate suture of the mucous membrane whenever possible, and the pylorus is included unless there is too great disproportion between the size of the ulcer, and the area of the stomach that would be removed. I have had no inaccessible ulcers, but would make every effort to resect such ulcers from either without or within the stomach cavity. In all cases, whether the ulcer can be resected or not, where the pylorus is not strictured or resected, the pylorus is occluded and a gastro-jejunostomy, of course, is done. There are cases so extensive that nothing is possible except jejunostomy, but these cases are, of course, in a class by themselves.

No doubt you wonder what I have against the pylorus. The use of the pylorus is unquestionably mixed up with the causation of duodenal, and its disuse as the result of spasm probably with that of gastric ulcers. More than this, a patent pylorus modifies or prevents the good results obtained by a gastro-jejunal stoma.

Closing the pylorus absolutely protects the duodenum, and it insures the continued use and benefits of gastro-jejunostomy. It can be done by submuscular resection with little technical difficulty and little risk. To my mind its routine use is logical. Gastro-jejunostomy is an essential part of the treatment of gastric ulcers. Whatever the function it fulfills, it is performed only when it is used for emptying the stomach. Why not insure its action?

Since adopting this rather radical system, and since adopting the use of separate suture of the mucous membrane I have had complete cures and no deaths, but I have had only a few cases, and those comparatively simple. I recognize the fact that I must necessarily in time get an increased mortality, but I believe by setting our minds to the more serious necessities of ulcer surgery we will improve and master the technical requirements, and this, combined with getting our cases earlier, will enable us to place the mortality so low as to compare favorably with the 1½ to 2% of gastro-jejunostomy.

A PRELIMINARY REPORT OF 45 CONSECUTIVE CASES OF MALIGNANT GROWTHS TREATED WITH X-RAYS.*

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Late methods of treatment and especially the advent of the Coolidge tube offer powerful means of offense against deep-seated cancer, and enable the cancer therapist to combat metastatic growths and even to anticipate and prevent metastasis, by irradiating the lymph glands under suspicion, which can be done without harm to the patient. Perfected technic in the use of the soft rays, makes the cure of superficial cancer a certainty.

Prior to the development of the massive filtered dose technic, however, we were practically helpless when metastasis occurred.

It is my firm belief that perfect team work between the surgeon and the roentgenologist will result in cure of the great majority of cancers. Painful experience leads to the belief that cancer with bone involvement is beyond power of the roentgenologist to cure, and if they be in surgically inoperable locations, it is as well to let them alone. We may also theorize that cancer is incurable either by surgery, or *x*-rays, or both, in the liver and some of the ductless glands.

The 45 cases herewith reported are consecutive cases as to treatment, being all the cases which have submitted to treatment by me within the scope of this report.

When I adopted the massive filtered *x*-ray dose, for deep-seated cancer ("A Technic of the Roentgen Ray massive dose for Treatment of Deep-seated Cancer," McCoy, *Journal of the Indiana State Medical Association,* June, 1915) and the intensive soft *x*-ray dose for superficial cancer ("Carcinoma Cutis and its Cure by Roentgen Rays, a Soft Ray Technic, McCoy, *Interstate Medical Journal,* vol. XXII, No. 7), I determined to offer treatment to all patients of whom there was any possibility of cure, a course I had not theretofore pursued.

The patients ranged in age from 29 to 82; two are 29, but there was no increase in relative frequency until 50 years was reached. The disease proved relatively more frequent at 60 years of age than at any other.

Some conclusions may be drawn in regard to exciting or predisposing causes of cancer.

I would particularly direct attention to cancer of the lip and mouth, which has very often been attributed to smoking. Of 95 consecutive cases, some of which were treated and reported herein, 27 were cancer of the lip or mouth. Of the 27 cases, 5 were women and 22 were men. Of the 22 men, 12 had the disease on the lip and 10 within the mouth. Of the 22 men, 11 were smokers, some of whom were very moderate in the indulgence. Of the 5 women, 3 had the disease on the lip and 2 within the mouth. None was a smoker.

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*Read before the Western Roentgen Society, St. Louis, Mo., June 9, 1916.

Attention is urged, as in previous papers, to the importance of removing warts, moles, nevi and keratoses, and I recommend *x*-rays or the dessication method as the best means of removal.

All of the lesions, with the exception of nevi, can be removed by the dessication method with perfect results. The nevus, however, is best treated by *x*-rays.

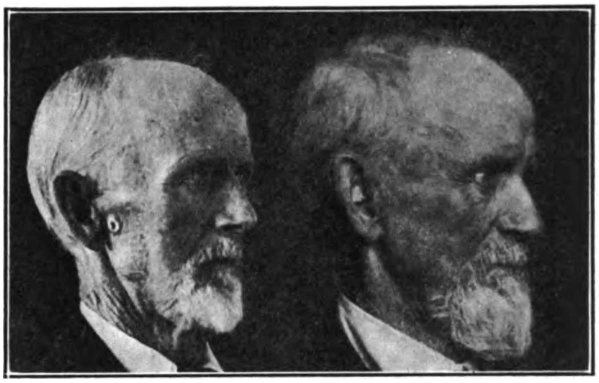
Cases are classified as primary, post-operative, recurrent post-operative and metastatic. The term "post-operative" refers to those cases operated upon by the surgeon with a view to *x*-ray treatment, and which were thus treated, immediately after operation. The term "recurrent post-operative" refers to those cases in which surgery was wholly relied upon as a cure, and in which there was a recurrence after operation.

The massive filtered doses used on these cases varied from four to six Holzknecht units, with the reaction pastille near the skin, and the entire filter between it and the tube.

The filters used in these cases varied according to the depth of the cancer. The majority of such treatments were given through six millimeters of aluminum and a layer of sole leather and I have found that such treatment, excluding, as is done, all but the hard rays, produce but a very moderate reaction on the skin, and I have produced in some instances a marked reaction internally, with nothing more than an erythema on the skin. In the cases of superficial malignancy the "intensive soft ray dose" was used with a view to, or in the hope of, causing a disappearance and cure of the lesion with one treatment, in which I succeeded in a number of cases.

Prior to the invention of the modern *x*-ray apparatus which has made modern methods of *x*-ray therapy possible, I treated many cases of skin cancer successfully and had but few failures or recurrences, but at that time I strove for the same physiological effect, that of a first to second degree reaction, by means of the divided dose, that I now try to obtain with one or two treatments. I have learned that there is no evil result to be feared from a second degree reaction, provided it be properly cared for. For purposes of report and consideration by myself, cases are called *cured* when the disease disappears and remains so, after all visible *x*-ray reaction has subsided. It is a uniform practice, however, to require patients to report monthly for observation for one year after *cure* is pronounced. Communication is maintained indefinitely, so far as is possible. I shall be glad to acquaint the medical profession with the further history of the cases. No time limit has ever been or can be established on the recurrence question. To fix a limit would be purely arbitrary. Suffice it to say, from my own experience, that all recurrences I have seen, have came within 18 months.

The doses used varied with the character of the lesions, from Tint IV Sabourraud-Noire, in those lesions which were comparatively flat and of short duration, to 12 Holzknecht units in elevated tumors and in a melanotic sarcoma of the face. A scar has not resulted in any of these cases.


Figs. 1, 2. Case 56. Before and after treatment.

Biopsy was had in all the deep-seated cases and as many of the superficial ones as possible. It was not had in all superficial cases for three reasons:

First—It is not always possible to secure the necessary fragment, as some patients will not consent.

Second—Biopsy in a typical superficial cancer is useful, only as a matter for report and record, and has no bearing upon the outcome of the case. A basal-celled cancer yields more readily to *x*-ray treatment than a spindle-celled growth, but they both yield.

Third—It is inadvisable to cut into a cancer before *x*-ray treatment, as such interference acts a stimulant to the growth and promotes metastasis. And again, if a specimen is to be procured after treatment, it must be done within a few days following; if too much time elapses, the histological findings will be markedly altered by the effect of the rays.

Case 29. Female, age 59; carcinoma, middle of lower lip; a distinct intramural tumor in center of lip; duration one year; there is a history of a precancerous lesion at this location many years prior; no biopsy possible; treated October 29th to December 30, 1913, with a filtered massive dose; cured.

Case 30. Male, age 63; pirmary carcinoma, left side of face; duration two years; a typical lesion; no biopsy attempted; originated in a keratosis; treated December 6, 1913 to January 6, 1914, with soft ray technic; cured.

Case 31. Female, age 42; adeno-carcinoma of the cervix uteri and vagina; recurrent post-operative; treatment October, 1913 to Jan, 1914, with the filtered massive dose to which was added some direct exposure with the soft ray technic. This disease was well advanced on the vaginal wall before treatment could be instituted. There was a disappearance of the disease, but it recurred in a form of an abdominal tumor January, 1916. The patient died June, 1916, of abdominal metastasis.

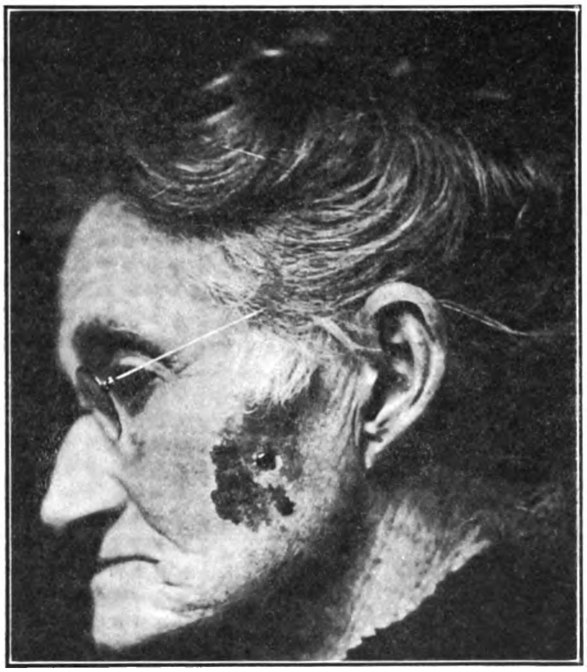


Fig. 3. Case 59. Before treatment.

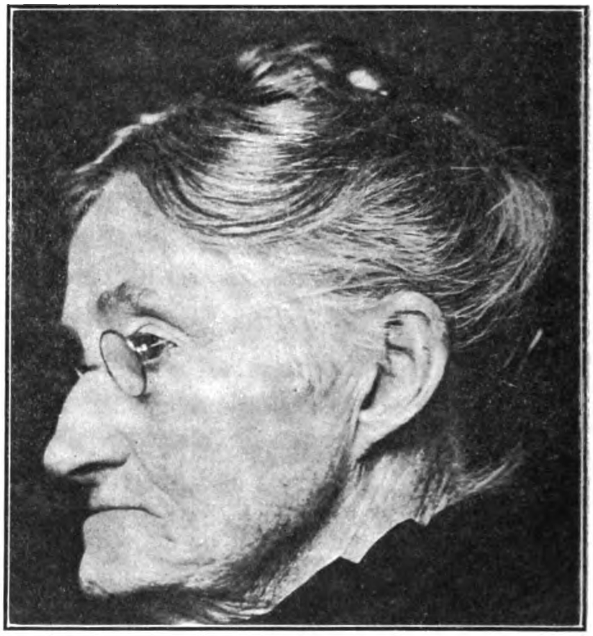


Fig. 4. Case 59. After treatment.

Case 32. Male, age 66; post-operative metastatic carcinoma of the glands of the neck; duration one year; secondary to a cancer of the lip which had been treated surgically. The disease then recurred in the cheek and was again operated upon. The condition in question followed this last operation after a period of two months; treated by the filtered massive dose September 27, 1913, to November 20, 1913; cured, but later died of paralysis.

Case 33. Male, age 72; post-operative carcinoma of penis; duration four years; treated October, 1913, with the soft ray technic without satisfactory results, and as the inguinal glands were involved, the filtered massive dose was administered by both groins, and amputation was recommended, which was done by Dr. V. A. Funk; cured.

Case 34. Male, age 52; recurrent post-operative carcinoma of the left axilla; duration one year; treated by the soft ray does October and November, 1914; cured.

Case 35. Male, age 67; primary carcinoma of the mouth and left lower jaw; duration one year; treated by the filtered massive dose September, 1913 to March, 1914; case proved intractable on account of bone involvement and there was a fatal termination, the lower jaw being destroyed.

Case 38. Male, age 66; primary carcinoma of the left lower jaw; treated September, 1913 to December, 1913, with the filtered massive dose, but on account of the bone involvement, it proved intractable and went to a fatal termination.

Case 41. Female, age 65; primary spindle-celled carcinoma of the scalp at the occiput involving the cranial wall; duration one year; occurred at the site of a wound; biopsy by Dr. Williams; treated by the filtered massive dose July, 1914 to November, 1914, without success. There was bone involvement and the patient died.

Case 42. Female, age 33; post-operative cancer of cervix uteri and vagina; duration two years; the operation was a panhysterectomy, but there was an inoperable extension along the vaginal wall at the time of operation; biopsy by Dr. Williams, Lecturer, but report in detail is not available. She was referred to me immediately after the operation and was filtered with the filtered massive dose July 24, 1914. This patient died of some obscure ailment, August, 1916. No satisfactory cause assigned; profound hysteria suggested; to be conservative, we will assume she died of metastatic cancer.

Case 47. Male, age 32; primary carcinoma of the nose; duration six months; no biopsy allowed; originated in keratosis; treated by the soft ray dose June 20, 1914; cured.

Case 48. Male, age 52; primary carcinoma, right side of the face near the nose; duration one year; a typical lesion; no biopsy; origin a mole; treated by the soft ray dose October and November, 1914; cured.

Case 49. Male, age 62; primary carcinoma on the face below the eye; no biopsy; appeared at the site of a bruise; duration one year; treated by the soft ray dose February and March, 1914; cured.

Case 50. Female, age 44; primary rodent ulcer of middle frontal region; duration three years; no biopsy attempted; origin not determined; treated by the soft ray dose December 7, 1914; cured.

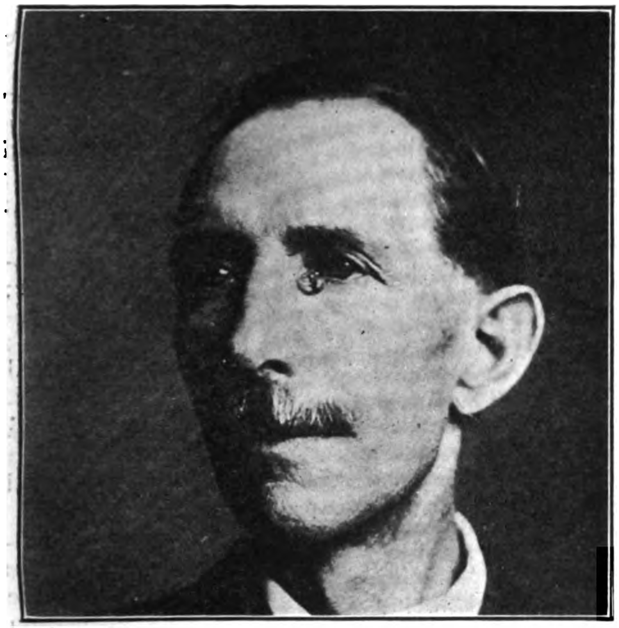


Fig. 5. Case 68. Before treatment.

Case 51. Male, age 65; primary carcinoma, left side of the neck; duration two years; origin not determined; no biopsy allowed; treated by the soft ray dose September and October, 1914; cured.

Case 52. Male, age 60; recurrent post-operative cancer of left side of cheek and nose; duration of disease six years; duration of recurrence two months; treated August 24, 1914, with the intensive soft ray dose; cured.

Case 53. Male, age 65; primary carcinoma, muco-cutaneous margin of the lower lip; no biopsy required; duration nine months; treated June 24, 1914, with the intensive sofe ray dose; cured.

Case 54. Male, age 60; primary carcinoma of the left side of lower eyelid; duration two months; biopsy was not deemed advisable; origin not determined; treated with the soft ray dose September and October, 1914; cured.

Case 55. Female, age 64; primary rodent ulcer of the left side of lower lip; duration two months; origin not determined; biopsy not attempted; treated with the soft ray dose July 8, 1914; cured.

Case 56. Male, age 72; primary carcinoma of left side of the face near the ear; duration four years; origin not determined; a typical lesion; no biopsy attempted; treated with the soft ray dose October and November, 1914; cured. (Figs. 1 and 2.)

Case 59. Female, age 49; melanotic sarcoma of the left cheek; duration not determined, because the lesion originated in a pigmented mole; biposy was not deemed advisable; treated with the intensive soft ray dose January, 1915 to May, 1915; cured. (Figs. 3 and 4.)

Case 60. Male, age 60; recurrent post-operative cancer of the left lower jaw; secondary to cancer of the lip duration (recurrence) three months; treated with a filtered massive dose February 24th, 1915; there was a distinct bone involvement and the patient died.

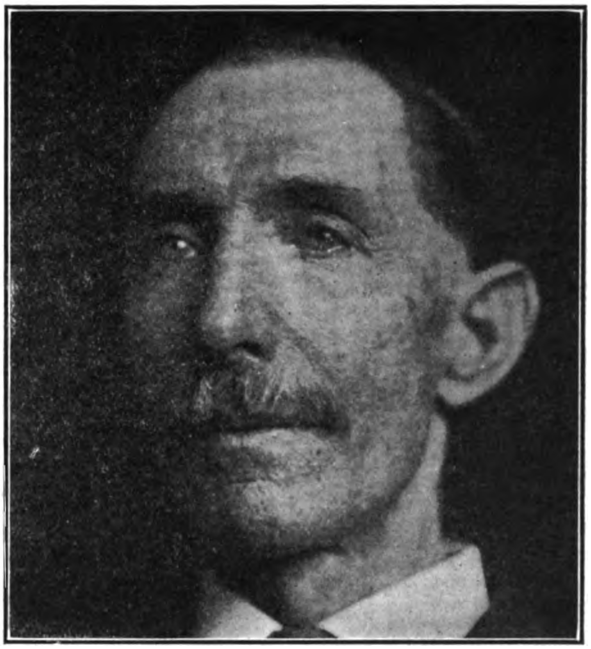


Fig. 6. Case 68. After treatment.

Case 61. Female, age 54; primary superficial carcinoma of the back; duration three months; origin not determined; biopsy not allowed; treated with the soft ray dose; January 13, 1915; cured.

Case 63. Female, age 51; primary carcinoma left side of the nose; duration 18 months; origin not determined; a typical lesion; biopsy not desired; treated with the soft ray dose April 27, 1915; cured.

Case 64. Female, age 39; postoperative recurrent medullary carcinoma of left breast, axilla and elbow, manifest as a recurrence in the skin of the breast, with enlarged glands in axilla and elbow; duration four years; biopsy by Dr. Williams; tumor of the right breast was operated; first operation, April, 1913; metastatic tumor in left breast was operated November, 1913; this operation was a simple amputation of the breast and there was a recurrence in the left exilla in January, 1915, which was operated upon in May, 1915; treated with the filtered massive dose June 24, 28, and July 21, 1915; cured.

Case 66. Male,, age 47; primary spindle celled carcinoma on back of the head near the neck; duration two years; origin not determined; biopsy by Dr. Curtner; treated with the soft ray dose July 27, 1915; cured.

Case 67. Female, age 47; post-operative spindle-celled carcinoma of left breast; duration six months; at time of operation the tumor was broken down; the operation was a simple amputation of the breast; biopsy by Dr. Williams; treated July 28 and 29, 1915, with filtered massive dose; cured.

Case 68. Male, age 58; primary carcinoma inner canthus of the left eye; duration three years; origin not determined; a typical lesion; biopsy not advisable; treated with the soft ray dose August 3 and September 1, 1915; cured. (Figs. 5 and 6.)

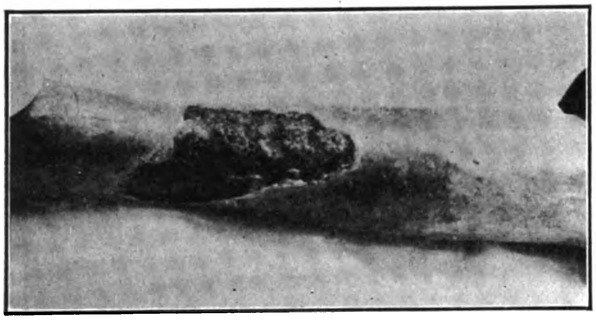


Fig. 7. Case 73.

Case 69. Female, age 38; recurrent post-operative myxo-sarcoma in region of right parotid gland; duration several years; biopsy by Dr. Williams; treated with the filtered massive dose August and September, 1915; cured.

Case 70. Male, age 63; primary carcinoma of right buccal surface following leukoplakia; duration ten months; treated with the filtered massive dose September and October, 1915; this patient died of angina pectoris before final discharge.

Case 71. Male; age 53; primary basal-celled carcinoma of left ear and surrounding region; duration 12 years; origin not determined; biopsy by Dr. Williams; one intensive soft ray dose administered September 15, 1915, after which he discontinued treatment. (Photograph.)

Case 72. Male, age 63; post-operative metastatic enixed cell melanotic sarcoma of the left side of the neck, involving and attached to the external jugular vein and extending to the infraclavicular region; duration three years; biopsy by Dr. Williams; resected by Dr. V. A. Funk, who referred him to me for post-operative treatment; biopsy by Dr. Williams. The surgeon warned me that he would suspect recurrence in the infraclavicular region as he believed that he was not able to get low enough to dissect all the diseased tissue; case was treated with massive filtered dose as soon as the wound closed; in September, 1915, the entire neck was irradiated including the aural and the infraclavicular region. At this time there was a metastatis in front of the ear and a recurrence back of the ear; there was no evidence of a recurrence in the infraclavicular region; cured.

Case 73. Male, age 67; an extensive stratified squamous cell carcinoma of the right anterior tibial region; biopsy by Dr. Williams; duration several years; occurred at the site of an injury; had metastatic involvement of the inguinal glands; treated September and October, 1915, with the soft ray dose and the entire inguinal regions irradiated with the massive filtered dose; inguinal involvement subsided and all evidence of cancer disappeared but the extensive tibial lesion was never closed. (Fig. 7.)

Case 74. Male, age 46; primary carcinoma of the right side of the neck; duration three years; origin not determined; a typical lesion; biopsy not sought; treated with the intensive soft ray dose September 23, 1915; cured.

Case 78. Male, age 79; primary carcinoma on the cheek near the eye; duration three months; origin a keratosis; there was history of very rapid growth and biopsy was not deemed advisable; treated with the soft ray dose September 30, 1915; cured.

Case 80. Female, age 59; post-operative endothelial sarcoma of the right side of the chest; involving intercastal muscle and subcutaneous region at 8th and 9th ribs; biopsy by Dr. Williams; duration several years; treated with the filtered massive dose October and November, 1915; cured.

Case 81. Female, age 50; primary carcinoma left side of the nose; duration four months; origin keratoses; biopsy was not deemed advisable; treated with the soft ray dose October 21, 1915; cured.

Case 82. Female, age 60; post-operative cubaidal celled carcinoma of the cervix uteri; there was an inoperable extension of the diseases along the vaginal wall; biopsy by Dr. Williams; duration one year; treated in November, 1915, with the massive filtered dose; cured.

Case 83. Female, age 63; post-operative recurrent carcinoma on the left side of the face near the eye; duration three years; origin keratoses; biopsy not thought advisable; treated with the soft ray dose November 19, 1915; cured.

Case 84. Male, age 73; primary carcinoma of the nose between the eyes, also on the right cheek; duration of the first lesion three months; of the second lesion one and one-half years; origin of both lesions keratoses; typical lesions; biopsy not allowed nor deemed advisable; treated by the soft ray dose December 30, 1915; cured.

Case 86. Male, age 77; primary carcinoma of the right side of the face; duration one year; origin not determined; lesion typical in character; biopsy not allowed; treated by the soft ray dose January 27, 1915; cured.

Case 87. Male, age 58; recurrent post-operative carcinoma of the lower lip; duration of recurrence six months; lesion was treated by the soft ray dose and the entire jaw was irradiated by the filtered massive dose January 28, 1916; cured.

Case 88. Male, age 67; primary carcinoma (malignant wart of the dorsal) surface, left hand; duration one year; treated February 15, 1916, with the intensive soft ray dose; cured.

Case 91. Male, age 50; primary spindle-celled carcinoma left side of the nose; duration nine months; origin not determined; biopsy by Dr. M. L. Curtner; treated by the soft ray dose; cured.

Case 92. Male, age 42; primary, basal-celled carcinoma of the left cheek near the eye; duration one year; an elevated tumor, beginning to break down in the center; biopsy by Dr. Williams; treated by both the soft ray and filtered massive dose February 23, 1916; cured. (Figs. 8 and 9.)

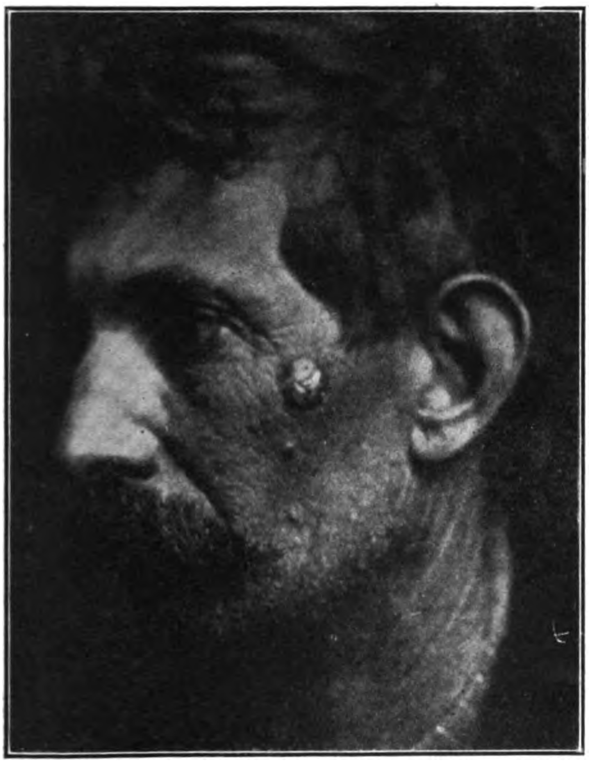


Fig. 8. Case 92. Before treatment.

SUMMARY.

Of sixteen cases of deep-seated cancer, nine were successfully treated; one died of another disease before discharge, and six cases ended fatally, in four of which there was cancerous involvement of bone. There has been recurrence of the disease in two cases, which has ended fatally. The remainder of these cases are alive and with no recurrence or metastasis.

Of twenty-eight superficial cancers, twenty-seven have been cured and one discontinued treatment. There has been no failure or recurrence in this class. Twenty-eight cases were primary, ten were recurrent post-operative and four metastatic. Fourteen most recent cases, all of which have resulted in apparent cure, have not been included in this series for the reason that permanency of the cures might be questioned. This summary is revised to date of this writing.

CONCLUSIONS.

1. In view of the success of Roentgen therapy in deep-seated cancers, and constant improvement in technic, the prospect is quite encouraging.

2. There is no prospect of cure of cancer when there is involvement of bone.

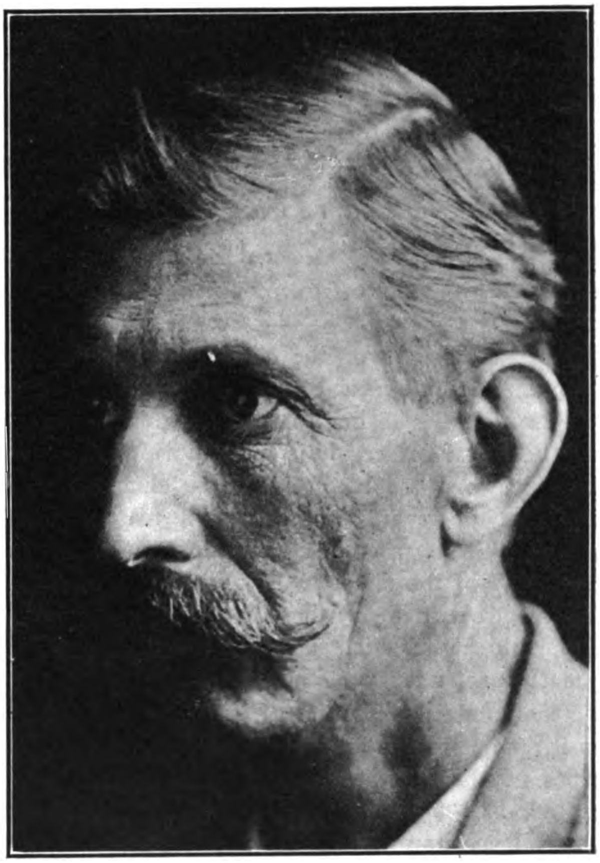


Fig. 9. Case 92. After treatment.

3. Cancer metastatasis, formerly an insuperable obstacle in cancer treatment, can now be successfully treated, if it can be located. There is, in regard to this, abundant chance for errors in judgment.

4. Deep-seated cancers should be operated upon and the operation should be followed by massive dose x-ray treatment as soon as the wounds close, *whether there be recurrence at the time or not.* The roentgenologist and the surgeon should both be magnanimous and disinterested enough to accept any possible assistance in behalf of humanity. The two agents should be allies, in the war against cancer.

5. Surgery in superficial cancer is worse than

useless. This class of malignancy can be successfully treated by *x*-rays alone, and surgery here is not an aid to roentgenology. I believe that when good surgeons become well acquainted with this phase of the question, that they will join the roentgenologist in classing this with other things known as useless surgery.

6. I am not unaware of the pessimism of the medical profession at large with regard to the recurrence of cancer after operation or other treatment. It will be admitted that sufficient time has not elapsed to warrant assurance of cure of these cases to the satisfaction of the profession. This has therefore been entitled a preliminary report.

ABDOMINAL HERNIA AND "RUPTURE."

(Standardization of Nomenclature.)

G. Paul LaRoque, M.D., F.A.C.S.,
Surgeon to Memorial Hospital,
Richmond, Va.

Most authors favor the elimination of the term "rupture" from surgical nomenclature. Insofar as the term applies to hernia at the inguinal, femoral and umbilical orifices it is quite uniformly agreed that the word "rupture" should be eliminated. Is there not, however, some legitimate reason for restraining the term to designate those defects in the continuity of the abdominal wall remaining or subsequently occurring at the site of a laparotomy incision through which abdominal contents subsequently protrude?

The standard definition of true hernia, certainly as it applies to the inguinal, femoral and umbilical types of the disease, is now quite uniformly accepted, as, "a protrusion of a pouch or sac of parietal peritoneum." The essential structure, therefore, entering into the formation of true hernia is a sac of parietal peritoneum. Strictly speaking this is the only structure necessary to fulfill the definition of hernia. With this as a definition of the term no explanation is required for the fact that a patient has hernia even though recumbent and the sac empty, though, of course, the sac may contain bowel, omentum and other abdominal contents when intra-abdominal pressure at these orifices is increased by erect posture, coughing, straining, etc.

Concerning the etiology of this type of hernia, the whole subject has been sufficiently clarified by extensive clinical and library research and the sum and substance of this research clearly and convincingly expressed in at least three editorials written by Walter M. Brickner in the American Journal of Surgery, in June, September and November, 1915. The views expressed in these editorials must certainly be acceptable as the expression of standard belief. True hernia is essentially congenital in origin and a hernial sac is as much a malformation as is the sac of meningocele (cerebral or spinal) or that of a branchial or coccygeal cyst. To my class in the Medical College of Virginia I have taught this for five years as a substandard belief. Since the appearance of the editorials by Brickner, there need be no hesitation in expressing in positive terms the etiology of hernia of the abdominal wall. From a study of many thousands of herniae of these orifices and the performance of operations and witnessing operations at the hands of other surgeons in many hundreds of herniae, I have never seen one case in which there was any evidence at operation that such hernia was of traumatic origin. Moreover, while it seems reasonable to believe that coughing, straining, heavy lifting and other such efforts may possibly cause such herniae to become larger (certainly it becomes larger and gives the impulse when coughing), yet I am quite willing to go on record with the belief that such factors are not truly causative of herniae.

Concerning incisional, ventral or, if one please, "traumatic hernia," we have a different state of affairs. In these there is no protrusion of the pouch of parietal peritoneum. Frequently when such "herniae" are of long standing, operation will reveal to superficial examination, an appearance somewhat resembling peritoneum, though as a matter of fact, there is no true peritoneal sac as an essential part of the pathology of this type of hernia. There is a true solution of continuity or rupture of the abdominal wall, the hole extending through the abdominal wall from the peritoneal cavity completely or incompletely through to beneath the skin. This type of "hernia" follows operation for intra-abdominal conditions that necessitates drainage at the time of operation; or it develops at the site of wound which, as a result of infection, have broken down; and in certain rare cases, there is separation of the edges of the peritoneum or fascia as a result of improper apposition or the breaking of sutures before the union has become firm. In other words, this type of "hernia" is truly a rupture of the abdominal wall. In cases requiring drainage the rupture exists at the site of the drainage tube or gauze when the patient leaves the operating table. In cases due to separation of structures, the rupture occurs while the patient is in convalescence, though the protrusion may not be visible to the patient or easily detectable to the examiner until some months later after tissue shrinkage has occurred.

At least for the present, therefore, it seems not altogether unjustifiable to retain the term "rupture" for so-called post-operative incisional herniae. This belief is further substantiated by the standard methods for the cure of this affection. It is now uniformly agreed that the most essential part of the operation for the cure of hernia of the inguinal, femoral and umbilical orifices, consists in the complete removal of the sac by enucleation and firm closure of its neck by high ligation or suture. Though it is standard practice to close at least the inguinal canal and perhaps the femoral, and by overlapping to obliterate the umbilical orifice, yet it has been demonstrated, at the Mayo clinic and elsewhere, including a few cases in my own practice, that in certain small herniae a tight closure of the neck of the sac from the inside of the general peritoneal cavity (especially when preceded by inversion of the sac by means of forceps pulling it up from the bottom), there will be no recurrence even though the canal is not closed. We would certainly, however, not trust solely to this without closure of the canal in herniae other than those of small size.

Concerning incisional rupture, however, the standard practice and the only way to avoid recurrence is to unite accurately the separate layers of the abdominal wall, the peritoneum and internal fascia generally in one layer, the muscle and external fascia in separate layers and to overlap these layers as much as possible. This under perfect asepsis and hemostasis, provided the sutures are not made so tight as to strangulate the tissues, results in permanent cure. In contra-distinction to the standard methods in dealing with true hernia with its sac of parietal peritoneum, no effort is made to remove the peritoneum and indeed all tissues capable of union should be preserved. So that the essential difference in the practice for the cure of true hernia and "rupture" is based upon the differences in the pathology of the two affections. Hernia is cured by excision and high ligation of the sac; rupture by accurate coaptation most certainly secured by overlapping the various layers of the abdominal wall. With these differences in etiology, pathology and treatment, may we not retain both hernia and "rupture" in nomenclature and standardize their definitions?

There ought to be no great difficulty in distinguishing a hydrocele of the cord from a hernia. The translucency test will help, if in doubt.

CARCINOMA OF THE MAMMARY GLAND IN A GIRL OF 12 YEARS OLD.

A. H. Levings, M. D.,
Surgeon to St. Joseph's Hospital,
Milwaukee.

This patient was brought to my clinic at St. Joseph's Hospital for examination and possibly operation on November 15, 1912.

The family history, so far as it could be obtained, was negative. Two or three months before I saw her this girl had noticed a lump in her right breast. It was described as being a little larger than a hickory nut and was the site of some pain. As it did not disappear, the mother took her to a physician who kept her under observation for a few weeks, during which time he thought the lump was increasing in size. She was then brought to my clinic.

The growth was then a little larger than an English walnut. It was situated beneath and a little below the nipple, which was retracted. The growth was hard, irregular in outline and did not move except with the surrounding tissues. It was not attached to the skin nor to the pectoral fascia. It did not seem to be encapsulated. The axillary glands were not enlarged. From its physical characteristics it was thought to be malignant and excision was advised. This was consented to and carried out the same day. The growth was removed by two curvilinear incisions which passed about an inch from each border and included the nipple. After excision the growth was turned over in the palm of the hand and an incision made through it from the back. It was seen to be non-encapsulated, grayish white in color, had an irregular border and was invading the surrounding tissues. The axilla was not opened, the wound was closed by a few silkworm-gut sutures. Barring a slight infection the wound healed kindly. Up to this date so far as known there has been no return.

The growth was passed over to the pathologist of the hospital, Dr. Daniel Hopkinson whose report follows:

"Section No. 1. The section contains a stroma composed largely of mature fibrous connective tissue greatly increased in amount, the glandular elements being very few and widely separated. These glands are lined by a single layer of cuboidal epithelium; in the walls of the glands within the subepithelial tissue are proliferating round cells. This section presents the histology of a *fibroma*.

"Section No. 2. In this section there is also an increase in stroma with areas of myxomatous change. The glandular elements are, however, more numerous than in section No. 1, there is also some hyperplasia of the lining epithelium, many of the glands and ducts containing several layers of cells. The lumina of some of the glands are dilated, with a tendency of cyst formation. This section presents the histology of a *fibro-cyst-adenoma.*

"Section No. 3. This section contains a very small amount of stroma within which the epithelial elements are arranged in the form of irregular shaped masses, their line of demarcation from the surrounding stroma often being difficult to determine. In some areas the epithelium forms distinct glands lined by several layers of cells, denoting the glandular origin of the epithelium forming the nests of cells which invade the stroma. This section presents the histology of a *glandular carcinoma.*"

Figures 1, 2 and 3 are drawings from microscopical section of the tumor. It is interesting in this connection and also instructive to know that different sections of the growth presented entirely different characteristics. Sections from the exterior of the tumor indicated a fibroma. More centrally situated sections were like an adeno-fibroma and in places like an intercanalicular growth, while sections near the center were distinctly carcinomatous. This is important in showing that sections from different areas of a doubtful growth should be examined as they present very different characteristics.

At the time of operation this girl was 12 years of age and stated that she had not menstruated. I think, however, from the well developed condition of her breasts that she was bordering on puberty.

Bland Sutton says that cancer of the breast never manifests itself before puberty and seldom before thirty. This is one of the few cases that have been reported of carcinoma of the breast occurring before puberty and I believe none, so far as I have examined the literature, have been reported as occurring under 12 years of age. The increasing number of reported cases of carcinoma in children and young adults should lead us to be not too positive in excluding carcinoma and epithelioma in children.

I have gathered from the literature and from my own practice the following cases of carcinoma in children, the great majority of which were attested carcinomatous after microscopial examination by competent pathologists. This list makes no pretense of being complete and as a rule the cases were reported during the past 10 or 15 years. Besides the following cases I have operated upon a girl of 17 years with carcinoma of the rectum and on a child aged 4, with a large adenocarcinoma of the ovary.

Carl Stern (*Deutsche Med. Woch., page* 494, 1892), under the title "Zur Kenntniss Maligner Neubildungen in Kindesalter," has gathered from the German literature and from his experience in Marien Hospital, Düsseldorf, the following cases occurring in children.

1. Carcinoma of the knee in a new born child, which conformed in microscopical structure to a uterine carcinoma of the mother.
2. Carcinoma at the tip of the nose in a new born child.
3. Uterine carcinoma in a girl of 8 years.
4. Carcinoma of the liver, congenital.
5. Carcinoma of the liver, congenital.
6. Carcinoma of the ileum in a boy of 13 years.

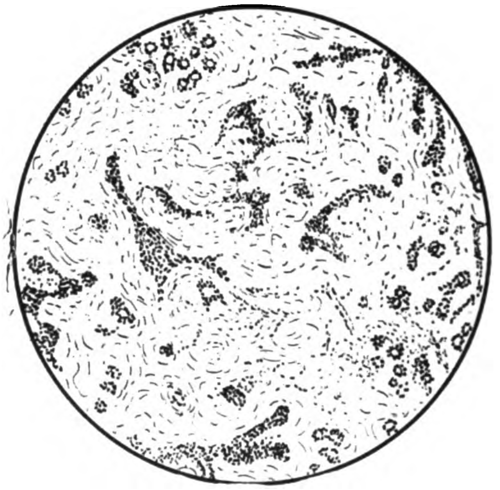


Fig. 1.

7. Carcinoma of the liver in a boy 12 years.
8. Scirrhus carcinoma of the small bowel in a boy of 3½ years.
9. Carcinoma of the stomach in a 5 weeks' old child.
10. Carcinoma of the sigmoid leading to stricture in a boy of 9 years.
11. Adenocarcinoma of the rectum in a girl of 11 years.
12. Carcinoma in an ovarian cyst in a girl of 15 years.
13. Carcinoma of the stomach in a boy of 14 years.
14. Carcinoma of the rectum in a child of 12 years.

R. Scholz, Breslau, has recorded three cases of carcinoma of the stomach in persons under 10 years.

Röhrer, in his monograph "Das primäre Nieren carzinom" observed 115 cases of which one-third were under 10 years of age.

Schoenig saw two cases of carinoma of the rectum of girls of 17 and collected thirteen additional cases from the literature.

R. C. Grulee in *Surgery, Gyneocology and Obstetrics,* 1906, reports a case of adenocarcinoma of the rectum in a girl of 16 years. He collected from the literature two additional cases of cancer of the rectum in children ranging from 12 to 18 years.

Wm. A. Edwards, *American Journal of the Medical Sciences,* vol. 138, 1909, tabulates the following cases of carcinoma of the ovary in children which were reported by the following writers.

Doran, 7 months, fetus cancer of the ovary.

Majorlin, child 1 year, cancer of the ovary.

Weil, child 5 years, adenocarcinoma of the ovary.

Parry, child 7 years, carcinoma of the ovary.

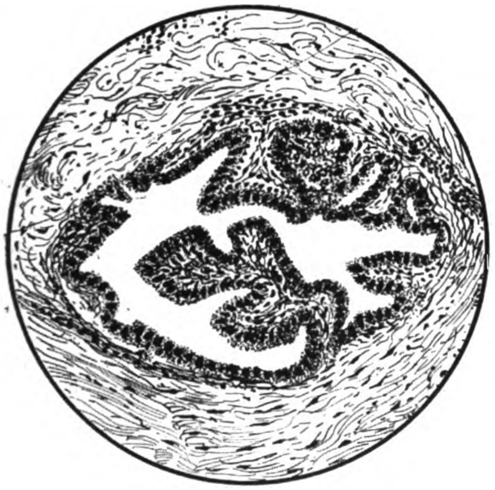


Fig. 2.

Olshausen, child 8 years, carcinoma of the ovary.

Stolpinsky, child 8 years, carcinoma of the ovary.

Gussenbauer, child 8 years, carcinoma of the ovary.

W. H. Sharp, child 8 years, carcinoma of the ovary.

Leopold, child 9 years, carcinoma of the ovary.

Palmer, child 9 years, carcinoma of the ovary.

Smith, child 13 years, carcinoma of the ovary.

Thorton, girl 15 years, carcinoma of the ovary.

Vonszabo, girl 15 years, carcinoma of the ovary.

Michel, girl 16 years, carcinoma of the ovary.

Binaud, girl 17 years, carcinoma of the ovary.

Stephen, two cases of carcinoma of the uterus in girls under 5 years.

Pick, carcinoma of the cervix in a child of 2 years.

Leidlcy, child 2 years, six months carcinoma of the cervix.

Homans, child 10 years, carcinoma of the addominal organs.

Gynghofer, child 8 years, carcinoma of the cervix.

Wells, child 13 years, carcinoma of the uterus.

Coppie, girl 18 years, encephaloid carinoma of the uterus.

Little, child 14 years, carcinoma of the cervix.

Tschap, girl 19 years, carcinoma of the uterus.

O. L. Castle, Kansas City, *Surgery, Gynecology and Obstetrics,* vol. 18, 1914, reports a case of primary carcinoma of the liver in a child of 10½ years. He has gathered from the literature of 42 cases of cancer of the liver in children, the youngest 1 day and the oldest 16 years.

Schlangenhofer, Vienna, 1902, reports a case of chorio-epithelioma in a child of 13 years.

Ehlfald reports a case in a girl of 17 years.

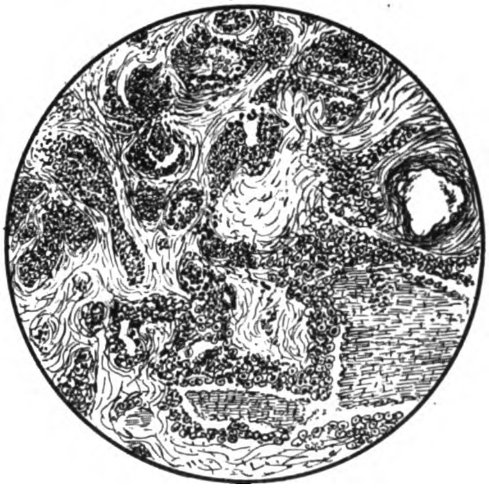


Fig. 3.

Champneys reports a case in a girl of 18 years.

Ward reports a case of epithelioma of the vagina in a girl under 20.

Fowler reports a case of carcinoma of the rectum in a boy of 15; also a mammary carcinoma in a girl of 17½ years.

Bryan reports a case of a boy 14 years, 8 months old who was struck with a golf ball in the right breast. After six months, pain occurred and a hard node formed. This was excised and the pathologist reported adenofibroma with distinct scirrhus carcinoma in scattered areas of active cell proliferation.

Bryan, *Boston Medical and Surgical Journal,* 1897, says that Blodgett reported a case of carcinoma of the breast in a boy of 12 years.

Gardner & Cummins report a case of carcinoma of the prostate in a lad of 17 years, *California State Journal,* 1914, page 79.

"The occurrence of neoplasms in the young," by Alfred Scott Warthin, of the Pathological Laboratory of the University of Michigan (*Archives of Internal Medicine,* vol. 15, 1915). Report based on an analysis of 2,000 cases of malignant neo plasms, records:

Child 11 years, squamous cell carcinoma of the leg.

Child 14 years, squamous cell carcinoma of the mouth.

Child 14 years, carcinoma of the stomach.

Child 14 years, adenocarcinoma of the umbilicus.

Child 14 years, basal cell carcinoma of the eye.

Child 15 years, adenocarcinoma of the ovary.

Child 15 years, medullary carcinoma of the ovary.

Child 18 years, basal cell carcinoma of the eye.

Child 18 years, colloid carcinoma of the colon.

Child 19 years, me-astatic carcinoma in cervical lymph nodes.

Child 19 years, squamous carcinoma in cheek.

Child 20 years, carcinoma of the intestine.

Child 20 years, scirrhus carcinoma of the stomach.

Van Buren Knott, reports a case of a child of 11 years with carcinoma of the ovary. *Journal A. M. A.* vol. 64, 1915.

Ward reports a case of epithelioma of the vagina in a girl under 20.

J. R. C. Canney, reports a case of carcinoma of the stomach in a boy of 19. *British Medical Journal,* 1911.

R. Buccheri reports a case of epithelioma of the kidney in a girl of 3 years. R. Krieves, *Geniralis Decheria,* Paris, 1911.

Czrney, adenocarcinoma of the rectum in a boy of 13 years, *Muenchener, Med. Woch.,* 1896.

ARTIFICIAL DILATATION OF THE CERVIX IN LABOR.

First among the practices which should be condemned as meddlesomeness are attempts to cut short the period of dilatation of the cervix. As already explained, indeed, as every accoucheur knows, the only way to dilate the cervix safely is nature's way. Manual dilatation always tears the cervix. Colpeurynters often do so, and almost invariably, if traction is put on them, and in addition, they pull the cervix downward while the uterine action pulls it upward. Overstretching and dislocation of the cervix result, and gynecologic and urologic disease follows. Furthermore, danger of infection attends all these maneuvers, no matter how aseptically the operation is carried out.—JOSEPH B. DE LEE in *The J. A. M. A.*

CONSERVATIVE SURGERY OF THE EXTREMITIES. REPORT OF A CASE.

R. C. McCHORD, M.D.,
LEBANON, KY.

Conservation of the resources of a country, its forests, soil, productivity, water power, mines, animals, and its energy-producing forces of all kinds is a great civic duty. Equally binding upon our profession is the duty of conserving and restoring, when impaired by disease or injury, the inborn qualities and capabilities of the human body. Before condemnation it is our duty to make every effort to restore an injured organ, a damaged limb, or an impaired function, not alone from a surgical point of view, but from a socio-economic one as well. Before resorting to destructive or obliterative cures, by means of amputations, excisions and side-tracking, we should endeavor to restore the injured limb, protect the diseased organ, or tide over the disabled function in its emergency.[1]

Not many years ago it was the almost universal custom among surgeons to amputate for crushing injuries of the extremities, especially where the muscular and nervous as well as the osseous tissues had sustained extensive damage. It is perhaps fortunate for humankind that the oscillating pendulum of surgical thought has recently gravitated in the opposite direction, and that former pessimistic radicalism has been largely replaced by optimistic conservatism in practically every department of surgical endeavor. There can be no reasonable doubt that, under the older and more radical methods of procedure, important structures were in many instances sacrificed that might have been saved by the practice of intelligent conservatism.

So brilliant are the results of operative procedures, so easily and rapidly are they executed, and so certain of success are we in hitherto unapproachable surgical projects, that the temptation of a dazzling expedient at the expense of the patient's future is often too great for most of us to resist. Amputation is the greatest reproach to modern surgery; to destroy a function or to remove organs or limbs is a confession of weakness; mutilation is a further confession of our inability to restore diseased tissues or to save what is left of injured functions. The preservation of damaged tissues, organs, limbs, or impaired functions of the human body is a much more difficult proposition. Restoration of function, without the employment of operative measures, occurs oftener than the ultimate surgical statistics as recorded would seem to indicate. Time, patience, more intimate acquaintance with problems of human physiology and pathology, better understanding of the capacity of tissues to resist destructive processes, better estimation of the local or general vitality of structures in a given human being, will help to produce a better outcome in each special case. Laboratory findings, research work, and its possible eventualities should appeal to us more than the attractive, interesting and brilliant purely surgical successes. In spite of the tediousness, the harrassing and disagreeable details, and the many other objections in looking after a protracted case, it is a much more satisfactory result to save a badly damaged leg or arm than to lose it even by the best surgical methods, no matter how quickly or successfully the amputation may be performed, or how perfect the local effect may be.[1]

In the struggle for existence the economic aspect of conservative operative procedures is also entitled to most serious consideration, and the trend of modern surgery is along lines of tissue conservatism, anatomically and physiologically. The removal of a limb reduces the earning capacity of the individual; the amputation of a leg or an arm in a laborer means not only that the sufferer himself is reduced to poverty or crime, but if he be the bread winner of a family, all of those depending upon him become more or less dependent upon charity; they become a burden upon the taxpayer and the state. Every amputation represents a certain loss in the earning capacity of the community in which that person lives. It means a higher rate as well as a larger number of cripples and paupers. Surgery has failed in its duty to the state if it rushes precipitately into mutilating operations, i. e., until every effort has first been made to conserve or restore the individual parts or functions. The object of this may possibly be obtained, aside from the knife, by seeking assistance from the laboratory studies and the modern discoveries for the prevention of infection, as by improvement in the patient's resistance by the formation of anti-bodies, by the use of various sera or vaccines, or by inhibiting bacterial growth. On the other hand, operative surgery is always to be resorted to in time to save life and health. Radical measures are always to be employed when indicated, and it is to be remembered that what might look to the lay mind like brutal and precipitate destructive activity, to the surgical intelligence may be the very highest attainment of conservatism.[1]

If one thoroughly understands the nerve and blood supply of an extremity, and appreciates the fact that so long as a part has a sufficient blood supply it will live, then many structures may be conserved which otherwise would be sacrificed. A knowledge of the anastomoses between bloodvessels, which are particularly large and most numerous in the limbs, is of great importance in this respect, as amputation may be avoided or at least much less of an extremity removed if the surgeon feels certain that an adequate blood supply is present or will be established.[2]

The condition of the nerves is an important feature to be determined when one has been injured, but unfortunately a satisfactory conclusion cannot always be reached. Temporary numbness following an injury may be oftentimes misleading; not infrequently the day after injury sensation will be present which was not observable at the time or shortly after the accident. As a rule the pulse can be detected unless destruction of the artery has occurred above the point where pulsation is sought; but this is not always true, and "sometimes the pulse will not be discernible until several hours after the accident." The condition of the muscular structures is of less importance than that of the circulatory, osseous and nervous elements.[3]

The following recent case seems sufficiently interesting to warrant detailed report. It furnishes an excellent illustration of the results which may be secured in extensive crushing injuries by the intelligent application of modern conservative surgical principles:

E. L. B., aged twenty-seven, brakeman on a freight train, fell from his car while it was in rapid motion. The car wheel passed over his left shoulder and upper third of the arm, almost severing the latter from his body. The spine of the scapula and the coracoid and acromion processes were crushed into many pieces. The clavicle was fractured in its outer fourth, the upper third of the humerus was broken into many pieces, the soft tissues over the shoulder were a contused, lacerated and almost shapeless mass. From a point just above the anterior part of the axillary space, the tissues extending backward into the axilla were practically destroyed, leaving nothing in the axilla except the artery and vein. The median nerve was severed near its two roots, and protruded from the wound three or four inches among shreds of lacerated muscular and glandular axillary tissues. The muscular structures on the anterior surface of the upper third of the arm were ground into a pulpy mass, leaving the arm hanging by skin and fascia, a few of the outer muscles, and the axillary vein and artery. The radial artery was pulsating.

Acting under the dictum which I long ago accepted as the proper procedure in dealing with mutilated extremities, viz., that no primary amputation should be performed upon any of the extremities where circulation is present distal to the injury, I determined to try to save the arm. The crushed pieces of humerus were removed, leaving the periosteum, where possible, from a point at the junction of the middle with the upper third to within two inches of the head of the bone; the latter was intact in its cavity, and about two inches of the shaft remained.

The proximal end of the severed median nerve was then located, and the distal portion of the nerve protruding from the wound was brought upward, the two ends being united by several fine sutures. All disintegrated tissues were removed, and where possible severed muscles and tendons were united. The wound was freely drained. The soft structures healed rapidly, and the patient has since remained perfectly well.

There has been no reproduction of bone in the upper part of the arm, but union of the fractured scapula and of the clavicle has been satisfactory. The patient has perfect sensation in the entire arm and forearm, and has excellent use of the latter. By holding the arm and bracing it with the opposite hand where the bone was removed, he can flex and extend the elbow very well.

I plan to transplant into the injured arm a piece of bone from the patient's tibia, and I trust in that way to be able to make him an arm which will be functionally serviceable.

(1) Bissell: International Journal of Surgery, 1912, xxv, 169.
(2) McKinley: Journal Fla. State Med. Assn., 1915, ii, 68.
(3) Pritchard: International Journal of Surgery, 1914, xxvii, 59.

Training the Young Surgeon.

So much time is necessarily spent by the surgical staff in performing operations and treating wounds, that the more refined methods of diagnosis and observation which are more easily and more generally practiced in the medical wards are often neglected. The surgeon is frequently called on to treat a localized physical condition which is perfectly patent and which demands prompt operative relief; hence his characteristic habit of making a snap diagnosis, a method which, for surgical purposes, is often singularly effective. An abscess may advantageously be opened, or a hemorrhage successfully controlled, without an exhaustive inquiry into the patient's family history, and without the performance of searching clinical tests. The habit of rapid diagnosis may, however, be carried too far. Certainly it tends to preclude the more careful, deliberate, and thorough investigation which is often essential to the correct diagnosis of obscure or complicated pathological conditions, and which is more likely to be practiced by the visiting staff, and therefore learned by the intern, in the medical wards. . . . The beginner should not be plunged too quickly into the alluring atmosphere of the operating room, where all the conditions favor quick decision and action, but should first be trained thoroughly in diagnostic investigation, an art which attains its highest development in the medical wards.—S. S. Goldwater, in *The Modern Hospital.*

THE SO-CALLED "GONORRHEAL HEEL."

A SEMI-CRITICAL COMMENTARY.

Charles C. Mapes, M.D.,
Louisville, Ky.

With the realization that I shall most likely be adversely criticized for presenting this commentary, the following introductory remarks abstracted from an editorial in the Interstate Medical Journal (December, 1916) seems decidedly *apropos:* "By a peculiar weakness of human nature, people generally think too much about the opinion which others form of them. It is difficult of understanding why one should feel so pleased that other people have a good opinion of him, or say anything flattering to his vanity. If you stroke a cat, it will purr; and, as inevitably, if you praise a man, a sweet expression of delight will appear on his face, even though the praise be a palpable lie. What exists in the consciousness of other people should become a matter of indifference when we realize how superficial and futile are most people's thoughts, how narrow their ideas, how mean their sentiments, how perverse their opinions, and how much of error there is in the most of them; when we learn by experience with what depreciation a man will speak of his fellow when not obliged to fear him, or thinks what is said will not reach his ears. And if ever we have had an opportunity of seeing how the greatest of men will meet with nothing but slight from half a dozen blockheads, we shall understand that to place great value upon what other people say is to pay them too much honor!"

While the remark that "it is better not to know so many things than to know so many things which are not so," is accredited to a distinguished humorist long since deceased, it may be aptly applied to certain present-day observations in relation to medical and surgical practice. The four "F's"—fad, fancy, fallacy and fanaticism—in connection with the diagnosis and treatment of various clinicopathologic disorders afflicting the *genus homo,* have become so numerous that the mere mention of them without specific comment would fill a volume. However, the scope and intent of this dissertation, being limited to the presumed relationship between Neisserian disease and the development of extoseses upon the calcar pedis, preclude consideration of other fallacies which might prove equally interesting.

The statements of text-book authors and others to the contrary notwithstanding, the observation is pertinent that the etiology of local congenital or acquired osseous developmental errors—including exostoses, ecchondroses, osteophytes, bony spurs, ridges, etc.—in any anatomic situation, still remains submerged in apparently hopeless obscurity. No hypothesis thus far suggested seems sufficient to explain the fundamental cause of the hypernutrition which induces overgrowth and distortion of the osseous structure, although the traumatic or irritative theory appears the most reasonable and has much to recommend its general acceptance.

The present prevailing idea that the so-called spurs or osteophytes occasionally discovered by accident or otherwise upon the os calcis might owe their origin to invasion of the Neisserian diplococci, seems to have been originally advanced by Jacquet (1892), who suggested the designation "pied blennorrhagique" as being appropriate to represent such departures from normal osseous conformation. Nobl (1903 apparently confirmed the findings of Jacquet, and based upon the clinical histories of a limited number of patients emphasized the contention that the ubiquitous germs of Neisser were the probable causative factors. Since then numerous case records (purporting to be genuine) have appeared in orthopedic and urologic literature.

One author records a series of cases under the euphonious superscription of "gonorrheal exostosis of the os calcis," in some of which there appeared little recent or remote evidence of Neisserian disease, nor was it possible to isolate the characteristic diplococcus from body fluids or tissues submitted to bacteriologic investigation, culture, etc. The author freely admitted that in only one instance "was the organism obtained in pure culture," yet *mirabile dictu* claimed that in each the exostosis owed its origin to Neisserian disease!

In a larger series of cases recorded by another author, the Neisserian diplococci were demonstrable in only one. In some instances microorganisms "morphologically similar" were found, which merely illustrates the fallacy of laboratory findings reported by immature and inexperienced bacteriologists. It really seems the height of absurdity to place any credence whatsoever in such laboratory reports; a thousand things might be "morphologically similar"—an expression too frequently employed to shield the ignorance of the bacteriologist and in an attempt to mystify the uninitiated.

Quite recently there were reported before a local medical organization four clinical cases in which existing exostoses upon the os calcis as demonstrated by roentgenoscopy[*] were presumed to owe their origin to Neisserian disease, the only apparent reason therefor being that the patients were then or had previously been the subjects of so-called "urethritis, gonorrhea, or blennorrhea!" In the discussion which followed, one gentleman stated that such cases must be quite common, as he had encountered fourteen during the last few years; another vigorously disputed the assertions made by the reporter, and unequivocally denied the existence of so-called "gonorrheal heel!"

It may be worthy of note that according to the observation and experience of one of the most distinguished surgeons Kentucky has ever produced (the late Dr. Ap Morgan Vance), no definite relationship between Neisserian disease and spurs or osteophytes upon the calcar pedis has ever been positively demonstrated; he stated to me (1915) that he had never encountered an instance where osseous excrescences upon the os calcis could be even remotely attributed to the presence of Neisserian disease; that he had surgically removed many such excrescences, and the majority of the patients had never been the subjects of Neisserian disease. Based upon his experience, he concluded, therefore, that when present the two lesions must be regarded as merely coincidental and without definnite relationship.

The claim that "painful heel" due to the presence of spurs or osteophytes upon the os calcis may in any instance be correctly attributed to invasion of the Neisserian diplococci, seems infinitely more fallacious than the contention of a rather famous eastern urologist that "a peculiar burning sensation" involving the plantar surfaces of the feet and "recurring daily at exactly four o'clock P. M.," constitutes an invariable characteristic and pathognomonic clinical sign of prostatic disease. Verily, "the possession of a little medical knowledge is oftentimes an exceedingly dangerous thing!"

Brief notes of the four cases of so-called 'gonorrheal heel" reported in Louisville are interpolated merely to emphasize certain apparently fallacious contentions: It was claimed it had been definitely established that three types of osseous lesions might result from "gonorrheal" infection: (a) "simple periostitis, (b) hypertrophic osteoperiostitis, and (c) osteomyelitis." There appears some uncertainty as to when and by whom these facts were

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[*] In this connection, it seems pertinent to remark that surgical intervention predicated upon röentgenoscopic diagnosis of "spur" involving the os calcis, has not infrequently been the source of much chagrin to the operator. While according to the evidence afforded by the röentgenographic plate a "bony spur" existed upon the calcar pedis, yet none was discovered when the heel was incised. The explanation is obvious, i. e., the röentgenologist mistook the shadow produced by the normal tubercle of the os calcis for an extraneous bony excrescence. Mistakes of this character suggest that even the röentgenographic findings are sometimes distinctly fallacious, and greater care should be exercised in the appplication of this valuable method of diagnosis. It must not be forgotten that the angle at which the exposure is made may either exaggerate or minimize the object reflected upon the radiographic plate.

"definitely established," and it is a source of serious regret that the reporter failed to offer further evidence.

The clinical observation was accorded emphasis that the presence of Neisserian disease was demonstrated in each case. In three the urethral discharge was proven "gonorrheal"; in the fourth, "gonococci" were isolated from the prostatic excretion. In none was any heel pain noted prior to the attack of "gonorrhea"; in three, "gonorrheal" arthritis existed in addition to the exostoses upon the os calcis—in one of the latter the wrist and knee were implicated, in the second the wrist and shoulder, and in the third the wrist only. Both heels of one patient were involved; one also had typical "gonorrheal" iritis. Two patients with exostoses "had been in the hospital some time under ordinary treatment for gonorrhea"—including stock vaccines and phylacogens—without the production of permanent benefit; under autogenous vaccines they had improved, but were not completely relieved. Surgical removal of the exostoses had not been undertaken in any of the cases.

In the majority of the recorded instances (purporting to be genuine), according to the clinical history, the heel pain usually became localized at the tubercle of the os calcis, it developed during or following an attack of Neisserian urethrorrhea, and the presence of exostoses or osteophytes was demonstrated by röentgenoscopy. However, strange as the observation may appear, in some instances the patients complained of no heel pain until long after subsidence of the original disease, yet the attempt is made to maintain the obviously fallacious contention that the osseous lesions owed their origin to invasion of the Neisserian diplococci! Could anything more ridiculous and "far-fetched" be imagined?

In severe "heel pain" produced by exostosis upon the calcar pedis, it would be unreasonable and irrational to expect permanent benefit to accrue from any method of treatment not having for its object surgical removal of the offending osteophytes. Certainly, insofar as elimination of the osseous excrescences may be concerned, the administration of vaccines, phylacogens, etc., will accomplish about as much as might be anticipated from the exhibition of similar measures to restore the amputated portion of an arm or leg! Moreover, seminal vesiculectomy for the cure of the so-called "gonorrheal heel," which certain authors have recently attempted to popularize, should be condemned as an extreme exhibition of surgical fanaticism, its *raison d'etre* being about equal to the colectomy of Lane for the cure of goiter, of mammary epithelial hyperplasia, or of a papillary excrescence upon the cutaneous surface of the proboscis!

Where exotosis upon the os calcis is sufficiently extensive to require treatment, a satisfactory result in the majority of instances may be secured from surgical intervention. Recurrence is not unknown after removal, probably from persistence of the original causative factor, whatever it may have been. The suggestion seems reasonable that recurrence may occasionally be due to trauma incident to the operative procedure, but such an eventuation must be rare, else recurrence would be noted with greater frequency.

While I make no pretense to being ultra-scientific, nor do I claim the possession of unusual knowledge concerning the subject under consideration, yet based upon existing information the following fundamental academic propositions appear incontrovertible:

(1) That the terms gonorrhea (i. e., a flow of semen), blennorrhea and blennorrhagia (i. e., a flow of mucus), urethritis (i. e., inflammation of the urethra), gonococcus (i. e., semen berry), as at present almost universally employed, are totally inexact, inexpressive and fallacious, and should be eliminated from medical nomenclature;

(2) That likewise the word gonorrheal (i. e., belonging or relating to gonorrhea), wherever and however used, is distinctly erroneous, hence the expressions gonorrheal heel, gonorrheal exostosis, gonorrheal arthritis, gonorrheal iritis, etc., etc., are ridiculous and absurd;

(3) That "gonorrheal exostosis of the calcar pedis" literally interpreted would be equivalent to saying that the afflicted individual had a flow of semen from the os calcis producing an outgrowth of the osseous structure, and most assuredly the rankest fanatic in the world will agree that this would be an anatomic, physiologic and pathologic impossibility;

(4) That it has never been definitely demonstrated that the Neisserian diplococci are capable of inciting hypernutrition with consequent exostosis or osseous outgrowth in any anatomic situation, although systemic invasion of these microorganisms is frankly admitted;

(5) That even were it possible to isolate the Neisserian displococci from osseous excrescences excised from the calcar depis or elsewhere, the causal relationship would by no means be thereby established, since exostoses have been encountered with greater frequency in patients not the subjects of Neisserian disease;

(6) That the occurrence of osteophytes or exostoses upon the os calcis or elsewhere during or fol-

lowing an attack of Neisserian urethrorrhea is absolutely no proof of a necessary existing relationship, and to attribute the former to the malevolent influence of the latter is merely an expression of ignorance upon part of the observer;

(7) That it has not been shown that exostoses or osteophytes in situations other than the calcar pedis ever occurred from invasion of the Neisserian diplococci, nor has it been demonstrated that these microorganisms possess an elective or selective affinity for the os calcis, as inferentially contended by certain authors;

(8) That it appears strange that examination of the literature reveals no recorded instance of exostosis upon the calcar pedis in a female where any definite relationship was claimed between the osseous lesion and Neisserian disease, although it is well known other tissues embraced within the female organism are not exempt from the ravages of the diplococci of Neisser, in some instances there being infinitely greater structural damage than in the male;

(9) That even admitting the premise that: (a) "periostitis, (b) hypertrophic osteoperiostitis, and (c) osteomyelitis" may be due to invasion of the Neisserian diplococci, the production of exostoses or osteophytes (i. e., new osseous formation) still remains unexplained; the pertinent fact cannot be ignored that during and following the inflammatory lesions mentioned osteohelicosis rather than osteogenesis almost invariably ensues;

(10) That, finally, "gonorrheal heel" is equally as inexpressive and unintelligible as hematogenous kidney, acute abdomen, chronic appendix, and a thousand other not dissimilar diagnostic and anatomico-pathologic fallacies.

Renal Tuberculosis.

To diagnose a certain lesion one must bear in mind the probability of its existence, and the main reason here for the failure of an early diagnosis of renal tuberculosis is the fact that the general practitioner will not be divorced from the old belief that he is dealing with a cystitis, since all symptoms of renal tuberculosis point to the bladder. In the early stages repeated, careful microscopic examination of the urine will aid materially in the diagnosis. If after repeated search of a catheterized specimen of the patient's urine the tubercle bacilli cannot be found, a guinea pig should be injected to verify or refute the suspected diagnosis. In case the outcome is positive, every practitioner knows that 90 per cent. of urinary tuberculosis begins in the kidney, and he should now advise the patient the exact means for localization of the diseased focus.—Oliver Lyons, in *Colorado Medicine.*

AN UNUSUAL CASE OF JACK-STONE VESICAL CALCULI.*

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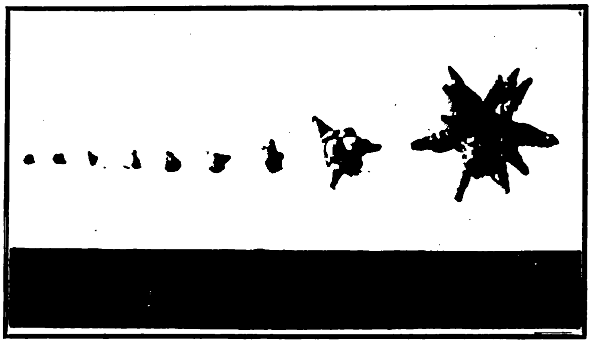
Newark, New Jersey.

Jack-stone calculi are of such rare occurrence that this case seems worthy of mention. On March 10, 1916, a man 84 years old was admitted to the service of Dr. Samuel E. Robertson in St. James' Hospital with the following history: "For several years past he had a gradual difficulty in urination with marked frequency, every hour, day and night, saying that he was sure he never completely emptied his bladder, passing only an ounce or two at a time. No burning upon urination. No hematuria. Two days before admission to the hospital he had retention which was relieved by catheterization and the contents of his enormously distended bladder completely emptied, which was followed soon after by bleeding. The bleeding became so active and the clots so large that he was unable to void at all, and the introduction of a large sized catheter brought forth nothing but bright red, bloody fluid.



In the hospital he came under Dr. Robertson's care and I saw the case with him. The patient was in such bad shape by this time that it was decided to insert a retention catheter through a canula suprapubically; but in several hours, although he had improved somewhat physically, we could see that the drainage tube was not large enough to admit of passage of the clots and that we were draining off only the fluid collected in his bladder and not diminishing his distention; so a suprapubic cystotomy was performed and two handfuls of blood clots evacuated from his bladder. In removing these clots the fingers in the bladder felt some sharp pointed objects which were removed. They proved to be calculi of the jack-stone variety, nine in number, and showing practically all the genesis of formation. The accompanying illustration is a reproduction in actual size. The largest stone has sixteen spicules projecting from it, while the smallest shows a few very slight elevations or protuberances. Examination showed them to be composed mostly of oxalates, with some urates and blood pigment. The stones were very dark, greyish brown in color.

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*Read before the American Urological Association, St. Louis, Mo., April 19, 1916.

As far as could be learned, this patient never evidenced any symptoms of vesical calculi, and the large amount of residual urine which he must have had for years afforded an excellent place for their growth. At the operation it was found that his vesical obstruction was due to a very large pedunculated prostatic middle lobe.

This case emphasizes the importance of the following points:

1. It is a dangerous procedure to completely and suddenly empty by catheter an over-distended bladder, for it not only creates a condition of shock but it also involves the risk of producing active hemorrhage, as happened in this case.

2. In these cases of prostatic obstruction where there are retention and enormous distention and the introduction of a large catheter brings forth only an ounce or so of bright red fluid, one can feel reasonably sure that active bleeding is going on and that repeated catheterization or even the introduction of a retention catheter suprapubically will not be sufficient to evacuate the large clots; and, therefore, it is imperative to do a suprapubic cystotomy, remove the clots and insert a large enough drainage tube.

3. When you have your fingers or hand in the bladder always explore it for stone, even though the patient never evidenced symptoms of stone.

THYROID DISEASE AND SEPTIC TONSILS.

Thyroid disturbances, including typical Basedow's disease, are associated with septic tonsils so often and show in some cases such marked improvement in all the symptomatic conditions after tonsillectomy and adenectomy that the relation of cause and effect is proved as more than a suspicion. And persistent thymus with status lymphaticus has been demonstrated in so many instances as associated with the need of tonsillectomy that coincidence does not satisfactorily explain it.—Wm. S. Tomlin in the *Indianapolis Medical Journal.*

PROSTATECTOMY.

The occasional surgeon, or the surgeon unacquainted with the science of urology other than as it crosses his path in the operating room, does not need to discuss the disputed questions concerning obstruction at the neck of the bladder due to prostatic hyperthrophy or distortion. To this sort of man a complete examination of the patient is not necessary. All that he needs to know is that there is an obstruction at the neck of the bladder, that it is probably due to an enlarged prostate, and that it can be removed surgically.

If he is lucky his patient will survive his operation, with the chances of more or less permanent disability. This is sufficient for some men. To others of us who have passed through the developmental stage of prostatic surgery, who can look back upon an uncontrolled hemorrhage, the unexplained death of some patients whose good general appearance lured us into a state of false security, we feel that we need a great deal more information in order that we may know beforehand what to expect in a given case and to choose, if may be, the safest course to pursue under the circumstances.—Paul Pilcher in the *Boston Medical and Surgical Journal.*

NITROUS OXIDE-OXYGEN ANESTHESIA.

Nitrous oxide-oxygen has a field of usefulness to which it should be strictly limited. It can be used for very brief operations, as it has been for many years in the extraction of teeth. It is also probably the safest anesthetic to use, as suggested by Ochsner, in cases of acute pulmonary congestion, or of acute nephritis. With these exceptions, which make its field a very limited one, nitrous oxide-oxygen should be looked upon as the most dangerous anesthetic that can be used, even in the hands of the most experienced.—J. F. Baldwin in the *Medical Record.*

THE BONE GRAFT.

At the present time the bone graft is undergoing the same abuses as did the Lane plate a few years ago. It will be overdone and abused, and it will probably not be long before we see some of the symptoms of reaction coming from different parts of the country. The bone graft is subject to the same surgical and mechanical laws as apply to the different methods of internal fixation, and if the surgeon cannot or will not master these laws under which he has to work, it would be better for him to leave this branch of surgery alone.—M. E. Preston in *Colorado Medicine.*

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, FEBRUARY, 1917.

THE RECURRENCE OF GALL-STONES.

Of much interest will be found the article in this issue, on the Recurrence of Gall-stones, by John B. Deaver, based on an experience than which few surgeons, living or dead, have had larger.

Recurrence of symptoms, requiring a second operation, developed in a little over 4% of his cases. What is especially significant, it seems to us, is that most of these recurrences (and in his latest, tabulated, series, *all* of them) were in patients in whom *cholecystostomy,* not cholecystectomy, had been performed. Secondary operations were required in some cases for adhesions, but in most cases for stone; and in 60% of the cases the secondary operation was required within one year after the first. We are quite prepared to accept Deaver's conclusion that in the majority of these cases the stones were not new formations but had merely been overlooked at the first operation.

This study adds another convincing argument to the desirability of the primary removal of the stone-bearing gall-bladder. Comparatively few are the anatomically and physiologically normal gall-bladders containing stones that give symptoms. Even those that appear thus normal at operation might better be removed, in our opinion; and, as a rule, all the others should be. A gall-bladder sick enough to be operated upon is too sick to be left in. There are, of course, cases in which exceptions should be made to such a rule, viz., in the occasional aged patient and in the very debilitated individual, where only the minimum surgical shock should be inflicted; in the presence of a long-established cholemia; in certain cases where *prolonged drainage* is desirable, provided that drainage of the ducts through the gall-bladder is not made impossible (as it often is) by stricture at the bladder neck. In the hands of an inexperienced surgeon, too, a cholecystectomy may be fraught with grave dangers, and for him cholecystostomy is much the wiser course. For the experienced abdominal surgeon, however, the removal of the gall-bladder, albeit by no means always a simple procedure, possesses no difficulties beyond his technical skill.

As Deaver repeats, "Under good conditions the mortality figures of the two operations do not greatly differ." We are inclined to believe that the greater mortality of cholecystectomy which some surgeons emphasize as an argument in favor of primary cholecystostomy is attributable, in part at least, to the technic employed. If a straight vertical incision is carried up to the costal margin itself; if the gall-bladder (emptied, if need be, by aspiration) is seized with an ovarian ring clamp and, with much of the liver, is thus dragged out of the wound; if the cystic vessels then exposed to view or to touch are at once tied; if, after protecting the field with packings, the visceral peritoneum is incised from the cystic duct to the bladder fundus, and the serous envelope is peeled back, the gall-bladder can be thus removed bloodlessly, with perfect surgical toilet (with no raw liver surface requiring tamponade), and, as a rule, no drain will be needed other than a small tube led down *to* the ligated duct to provide against leakage or *into* the open duct when biliary drainage is planned. With such technic the mortality of cholecystectomy, in our experience, is very small. To be sure, this method cannot be pursued when dealing with gangrenous gall-bladders and in other cases where the physical conditions make it inapplicable. But by whatever method the gall-bladder is removed by experienced surgeons, the mortality of the operation is not high; and if we include in the figures for cholecystostomy the deaths following secondary operations made necessary by the failure to remove the gall-bladder primarily, the mortality of cholecystostomy may be found to be even higher than that of cholecystectomy in the larger clinics!

Secondary operations on the bile tract are most often made necessary by symptoms produced by a diseased gall-bladder left *in situ,* and by those arising from a stone or stones also not removed at the primary operation. As important, therefore, as the radical treatment of the gall-bladder condition is the determination that the ducts are free from concretion. For this mere palpation, which is important, is usually not sufficient. The cystic, hepatic and common ducts should also be explored with a large probe or sound or small scoop—into the primary branches of the hepaticus and *well* into the duodenum. If the duct does not admit the sound or if, being dilated, it may permit the sound to pass by a stone, it should also be split open. Occasionally the hepaticus is crowded with small stones or bile sand. In such cases, especially, this duct should be freely drained; and Deaver points out an important lesson in urging the need of *prolonged* drainage in some cases of duct lithiasis.

We must be prepared to recognize, however, that, in a fortunately small number of cases, there is a re-formation of stones after a complete operation. These may form in the ducts (or gall-bladder after cholecystostomy). We incline to believe that in some cases they originate in the liver.

Deaver, with others, regards *infection* as the etiology of cholelithiasis, and surely infection plays an important rôle. It seems to us, however, that there are other potent factors. Precipitation of the inorganic salts of the body occurs elsewhere, *e. g.*, in the urinary tract, in individuals having recognizable metabolic diatheses. Lime salts precipitate in certain necrotic tissues without infection. The peculiar deposit of lime and other mineral salts that is so often found under the inflamed subdeltoid (subacromial) bursa in or about the supraspinatus tendon, is not produced by infection. Biochemical disturbances are probably also, in part at least, responsible for gall-stones. The studies of Henes, Rothschild and others have shown that cholelithiasis is usually associated with a hypercholesterinemia. Typhoid fever is generally given as a frequent cause of gall-stones but, in our experience, very few patients with cholelithiasis have had typhoid infection. Gall-stones are much more common in women than in men, and in many cases the symptoms are referred, in origin, to a pregnancy. During pregnancy the cholesterol content of the blood is much increased!—W. M. B.

THE PEACE OBLIGATIONS OF COMMISSION IN THE OFFICERS' RESERVE CORPS, MEDICAL SECTION.

In a recent editorial on "The Medical Reserve Corps and the Officers' Reserve, U. S. A." (THE JOURNAL, December, 1916) we called attention to certain obligations, in times of peace, assumed by those accepting commissions in the Officers' Reserve Corps of the U. S. Army, as stated in the act of Congress creating that reserve corps and in a circular issued by the Surgeon-General under date of September 30, 1916.

Since that editorial was published there has been issued for the Surgeon-General another circular, dated November 1, 1916, which interprets the obligations referred to more liberally and makes them largely voluntary.

Lest our December editorial discourage some of our readers who may have contemplated applying for commission in the Medical Section of the Officers' Reserve Corps, we quote from the second circular the following passages, most of the italics being our own:

> WAR DEPARTMENT,
> OFFICE OF THE SURGEON GENERAL.
> November 1, 1916.
>
> *To the Officers of the Medical Reserve Corps*:
>
> As there seems to be some misunderstanding as to the obligations assumed by officers of the Medical Reserve Corps in transferring to the Medical Section of the Officers' Reserve Corps, the following memorandum in addition to letter of September 30, 1916, is forwarded. . . .
>
> 3. Up to the limit of appropriations officers of the Reserve may be ordered to attend camps of instruction for fifteen days each calendar year. This may be interpreted as follows: *The Medical Department will follow the same plan as was followed in the case of the Medical Reserve Corps, i. e., circularize the Corps, and send to camps of instruction only those who express the desire to go.* The circular will give the location of the camps and the training periods. *Officers will be requested to select such training period as they may desire.* Orders will then be issued for the period selected.
>
> 4. Officers of the Medical Officers' Reserve Corps, are expected to take the Correspondence Course. This is desirable as the course covers in its four years the subjects of administration, camp hygiene, the duties of a medical officer, and other requirements with which a medical officer should be familiar. But *for those officers who are prominent in the profession, who are specialists, as surgeons, internists, pathologists, etc., who would in time of war be assigned to duty as specialists or for duty at base hospitals, the course is not an essential,* but for any officer who is to perform field duty, it is essential he should complete the four courses provided.
>
> The same applies to field training and attendance at the camps of instruction. *Both the correspondence course and the work in camps of*

instruction are considered highly desirable, but are not compulsory.

5. In time of peace no officer above the grade of first lieutenant can be ordered into active duty, and no first lieutenant can be ordered to active duty *without* his consent. The provision limiting active duty to first lieutenants does not apply to camps of instruction.

6. In time of war, or when war is imminent, i. e., when conditions are such that it is believed that war cannot possibly be avoided, all officers of the Officers' Reserve Corps are, of course, subject to the call for duty. This is to be expected, as each owes his duty and expects to fulfill his obligations to the country in this respect.

When called and assignments are made, it is the desire of the office to assign officers to duty according to their specialty. It can be readily understood that this plan can not in *all* cases be followed, as condition may arise that necessitate the assignment to a duty other than the specialty in civil life.

The Department is desirous that all officers of the Medical Reserve Corps transfer to the Officers' Reserve Corps, and we expect to maintain with the Reserve the same cordial relations as have existed in the past between the Surgeon-General's Office and the officers of the Medical Reserve Corps. The Surgeon-General wishes me to say that in accepting a commission in the Medical Section of the Officers' Reserve Corps. you are a medical officer of the Army—that you are not only in the Medical Department, but that you are of it.

H. P. Birmingham,
Colonel, Medical Corps,
Acting Surgeon General.

MEDICINE AND SURGERY—A NEW JOURNAL.

Dr. Philip Skrainka, of St. Louis, for six years editor of the *Interstate Medical Journal,* has severed his connection with that publication and, beginning this month, will edit a journal of his own, *Medicine and Surgery.*

Under his supervision the *Interstate* was not only a medical journal of unusual excellence but, also, it possessed a literary quality that made it distinctive.

With this editorship *Medicine and Surgery* cannot but have the same quality of literary elegance, and we may equally expect a high order of journalism reflected in the selection of contributed articles.

Surgical Suggestions

An "eczema of the navel" may be due to a discharging umbilical dermoid.

The modern tests of kidney function are of great importance, especially in determining the question of major operations upon the urinary tract; but they must be balanced with clinical findings and surgical judgment.

It is now well established in surgical experience that continued suprapubic drainage, relieving "back pressure" and obviating the distress of catheterization, will often so improve both kidney function and the general state that, after one or several weeks, prostatectomy may be safely performed upon an individual who would have promptly succumbed if it were attempted at the outset.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

Mortality Statistics.

Annually there are published compilations of mortality statistics which serve as the basis of constructive public health work, or are utilized in forceful arguments for economic advances.

The accuracy of mortality statistics naturally depends upon the thoroughness with which statistical data are secured from those reporting deaths. In the last analysis, the worth of valuelessness of mortality tables is determined by the carefulness of the physicians who filed the statements as to the causes of death.

The International List of Causes of Death has been accepted by this government, and it is necessary for physicians, throughout the country, to make use of the official nomenclature, in order to supply the basic information which permits of accurate classification.

While autopsy records may indicate a large number of pathological conditions, coordinately capable of causing death, the statistician assumes that each death must be charged to a single cause. Where several morbid conditions are recognized clinically, the physician must determine which is to be regarded as the primary cause of death and which may be satisfactorily deemed a contributory factor in the death. Herein, there is frequently considerable confusion, because the death certificate fails to present an orderly statement of primary and contributory causes. Similarly, errors frequently occur from sins of omission of clarifying terms, which leads to inaccurate classification.

It is fortunate that the campaign of education, directed by the Bureau of the Census, has aroused state and municipal health officers to the importance of securing complete information on the death certificates filed. Death registration plays an important part in developing the history of the public health movement. Inadequate or ill-defined returns hamper and retard the growth of satisfactory vital statistics, and statistical inaccuracies tend to undermine confidence in the reports concerning death and invalidity.

It is a commentary upon our interest in the abstract phases of public medicine that national vital statistics still fail to cover in 1914 more than 66.8 per cent. of the total population and only 41.3 per cent. of the total land area of this country. While physicians are not able, at the present time, to push rapidly ahead into the fields, not at present covered in the statistical tables, it is possible for them to seek to make their personal returns correct and adequate in the information contained.

Surgeons should not report deaths from cancer, carcinoma, or malignant tumor without indicating the seat of the disease. Death from an operation or from surgical shock, or even from hysterectomy, is insufficient information as the basic cause leading to any one of these conditions must be recorded. Under the new list of causes of death, there is a distinction between accidents, suicides and homicide, so that a mere statement of gunshot wound, as a cause of death, is insufficient for the purpose of classification.

It is a marked tribute to the efforts at cooperation in the profession that the number of reports requiring clarification have been greatly reduced during the past ten years. Diagnosis is apparently more complete and the recognition of primary and secondary causes of death is clearer. This is evidenced in the fact that in the Mortality Statistics of 1914 the number of deaths from ill-defined diseases is only at the rate of 12.1 per hundred thousand population, while the annual average for 1906 to 1910 was 29.4, and for 1901 to 1905 was 47.8. This advance in accuracy makes it difficult to compare the recent figures for mortality with those of fifteen or twenty years ago. This difficulty is increased because of the alterations in terminology, incident to the adoption of the international classification.

A consideration of the mortality figures for 1904 points out a few interesting tendencies in the mortality rate. Homicide, for example, with a death rate of 7.3 in 1914, has risen from the average of 1906 to 1910 of 5.9, and the average of 1901 to 1905 of 2.9. Deaths from fractures, with causes not specified, have decreased from 8.5 (1901 to 1905) to 2.9 (1906 to 1910) to 0.6 in 1914.

While the average age at death is gradually increasing, it is noteworthy that senility itself is less frequently being certified as the cause of death. This is manifest in the fact that the death rate from old age in 1914 was 19.8 as opposed to 29, as the average for 1906 to 1910. This presents excellent evidence of greater refinement in diagnosis and the distribution of actual causes of death, during the later decades, to other parts of the statistical classification.

The increase in cancer, relatively and absolutely, has been recognized, and despite the constant endeavor to secure early diagnosis and operation, the mortality rate from this cause is slowly advancing, being 79.4 in 1914 as against 72.6 in 1906 to 1910. Possibly, part of this increase is due to greater accuracy in diagnosis, but inasmuch as the early detection of carcinoma is more certain today than during previous years, earlier operation results and there is a distinct gain as a result of postponed deaths. The mortality, nevertheless, from this cause has advanced.

Operations for appendicitis have become notably common, but despite the general ease in diagnosis and the highly specialized technic which has been developed, the mortality rate has not fallen, having been 12.3 in 1914 and 11.2 for 1906 to 1910.

Similarly, hernia and intestinal obstruction do not evidence the sharp decline in the death rate that would be expected, in the light of our present knowledge of these conditions. The drop from 12.9 in 1906 to 1910 to 11.7 in 1914 is hardly commensurate with the advance in our information of methods of diagnosis or skill in operative treatment. A better example of operative skill, in what would be termed "minor surgery," is to be found in the fact that during 1914 there were only 5 deaths from amputations, a decrease in the number of deaths from gangrene, and a marked falling off of deaths from tuberculosis of the lungs and the viscera. The increase of the death rate from ulcer of the stomach is probably due to more accurate diagnosis, than to an increase in the occurrence of the disease, or to the failure of prompt surgical intervention.

It is evident, from the recital of these few figures from the Mortality Statistics of 1914, that judgment is required to interpret their meaning and a satisfactory interpretation of the reasons for changes in the character of the mortality rate is not possible without appreciating the changes in nomenclature and the more accurate registration of causes of death.

In order to raise the standard of the figures issued by the Bureau of the Census, every physician must realize, when filing a certificate of death, he is contributing a single isolated item to the vital statistics of the nation. He is offering his small share to the government in the interests of science and medicine, which is to determine the reliability and usefulness of the mortality statistics of the year. Preventive medicine seeks precise information and vital statistics should serve as the foundation for building up this branch of modern medicine.

Book Reviews

Recollections of an Alienist; Personal and Professional. Allan McLane Hamilton, M.D., LL.D., F.R.S. Octavo; 416 pages; with original illustrations, photographs and facsimiles. New York: George H. Doran Company, 1916.

An extraordinarily active and varied life is revealed in these memoirs. Born of distinguished ancestry, through social and professional connections Hamilton came into contact with some of the more prominent personalities of the nineteenth century. He traveled extensively, and he recalls some of the most stirring incidents of the Rebellion and of post-bellum times. In his professional work he was identified with many of the conspicuous medico-legal cases of the post few decades. All these activities are recounted in a manner that shows the author to be a born teller of stories. Dr. Hamilton speaks his mind plainly, and is evidently a man of sharp opinions and prejudices. It is difficult to pick out any portion of the book that is more interesting than others, but to our choice the chapters on his earlier years in New York are perhaps the most fascinating. There is not a dull page in the book.

Syphilis. By Loyd Thompson, Ph.B., M.D., Physician to the Syphilis Clinic, Government Free Bath House; Visiting Urologist to St. Joseph's Hospital; Consulting Pathologist to the Leo N. Levy Memorial Hospital, Hot Springs, Arkansas; Member of the American Urological Association and the American Association of Immunologists. Octavo; 415 pages; 77 engravings and 7 colored plates. Philadelphia and New York: Lea & Febiger, 1916. Cloth, $4.25, net.

The predominant feature of this book is its practicality. The author is apparently a man of broad practical experience in syphilis, and knows how to present the important data upon the subject in an interesting manner. He emphasizes the diagnostic and therapeutic aspects of syphilis, while the pathological, experimental and more academic phases are touched upon more lightly. The presentation is didactic, systematic and precise. Numerous references increase the value of the text considerably, but the author does not keep himself too much in the background. Wherever possible his own views and large experience are set forth judiciously. The book is an unusually well written and valuable contribution.

Hay Fever, Its Prevention and Cure. By W. C. Hollopeter, A.M., M.D., LL.D.; Attending Physician, St. Joseph's Hospital; Pediatrician to the Philadelphia General Hospital; Professor of Pediatrics, Emeritus, Medico-Chirurgical College, etc. Octavo; 347 pages; 5 illustrations. New York and London: Funk and Wagnalls Company, 1916.

This treatise, which covers the subject of Hay Fever quite at length, is a book that is perhaps rather for the laity than for the medical profession.

The author divides the work into three parts. In the first and second parts, the titles of which are "What Hay Fever Is" and "Accepted Causes," he reviews the various theories of the etiology of the condition. In the last part of the book, "Forms of Treatment," the different methods are discussed and the author's own methods are explained. The sections on the special therapeutic methods are handled by different writers.

Medical and Surgical Reports of the Episcopal Hospital, Philadelphia. *Volume* III. Octavo; 356 pages; illustrated.

This volume, edited by Astley P. C. Ashhurst, represents a high grade of scientific hospital work. It contains many intresting articles, several of them reprinted from medical journals.

Books Received

Aseptic Surgical Technique. With Especial Reference to Gynecological Operations, together with Notes on the Technique Employed in Certain Supplementary Procedures. By Hunter Robb, M.D., F.A.C.S., formerly Professor of Gynecology, Western Reserve University and Gynecologist-in-Chief, Lakeside Hospital, Cleveland, etc. Fifth Edition. Duodecimo; 292 pages; illustrated. Philadelphia and London: J. B. Lippincott Co., 1916. $2, net.

Surgical and Gynecological Nursing. By Edward Mason Parker, M.D., F.A.C.S., Surgeon to Providence Hospital, Washington, D. C., and Scott Dudley Breckenridge, M. D., F. A. C. S., Gynecologist to Providence Hospital. Duodecimo; 425 pages; 134 illustrations. Philadelphia and London: J. B. Lippincott Co., 1916. $2.50, net.

Anleitung Für Die Kriegschirurgische Tätigkeit. Von Prof. Dr. Lothar Dreyer, Leiter der Orthopäd. Abteilung und Oberarzt an der chirurgischen Universitaäts-Klinik in Breslau. 12mo.; 158S; 132 Abbildungen. Berlin: Verlag Von S. Karger, 1916.

Constipation, Obstipation and Intestinal Stasis. By Samuel Goodwin Gant, M.D., L.L.D., Professor of Diseases of the Colon, Sigmoid Flexure, Rectum, and Anus in the New York Post-Graduate Medical School and Hospital. *Second edition.* Octavo; 584 pages; 259 illustrations. Philadelphia and London: W. B. Saunders Company, 1916. Cloth, $6.00, net.

Oral Abscesses. By Kurt H. Thoma, D.M.D., Lecturer on Oral Histology and Pathology and Member of the Research Department of Harvard University Dental School; Instructor in Dental Anatomy, Harvard Medical School; Visiting Dental Surgeon to the Long Island Hospital, Consulting Oral Surgeon to the Boston Dispensary. Octavo, 213 pages. Boston: Ritter & Company, 1916.

Progress in Surgery

A Résumé of Recent Literature.

Wounds in War and Methods of Treatment. A. U. Desjardins, Waterville, Maine. *Journal of the American Medical Association*, January 6, 1916.

During the first six weeks of the war the battles were in the open, but after the battle of the Marne, trench warfare has been the rule. The conditions of moist climate and intensive cultivated soil are ideal for infection of wounds, and to this must be added the necessary delays, which were more marked in the beginning, and have caused complications very difficult to meet. In spite of these, however, at the present time, many of the field hospitals at the front are equipped with every essential. The rush of cases at times is very great. A French surgeon at the Somme front, in charge of a field hospital of 2,000 beds, had 600 wounded pass through his hands in thirty-six hours. Another working behind the Verdun front had, with his associate, to perform 400 operations under shell fire in an underground ambulance on the front line. At the first dressing station no operations were performed. The wounds are examined and dressed both with a view to the cleanliness and comfort of the patients, who are sent back to the nearest field hospital where they are given one or more doses of tetanus antitoxin. The wounds are explored and drained, accessible foreign bodies removed, fractures temporarily splintered, and all patients in condition for it are transported by motor ambulance to the nearest evacuation hospital, where needed additional treatment is given, and then sent as soon as possible by train to the base hospitals at Paris or other cities. During the first weeks of open fighting the number of bullet wounds was comparatively high, but since that time a large proportion of the wounds have been caused by shells, shrapnel, bombs or grenades. Bayonet wounds are rarely seen, because, inflicted at close quarters, they are generally fatal. The effect of the rifle bullet depends largely on the distance from which it has been fired. The frequency of explosive effects observed in such wounds received in the trenches is accounted for by the short range. There may have been isolated instances in which the German soldiers have reversed the bullets to produce greater destruction, but such are not necessary to explain the explosive effects. At short range extensive shattering of large bones is produced by the bullet, and fragments are driven through the surrounding soft parts.

Clean perforations of bones are rarely seen. Shell fire is largely of two kinds, shrapnel and high explosive. The latter is far the most destructive, innumerable jagged fragments being forced through the tissues, and one of the worst features is that these tear off pieces of clothing and carry them into the deepest portions of the tissue. The sudden violent explosion of one of these shells also causes more or less shock, which is sometimes fatal. Bombs, grenades and torpedoes are of many kinds, and exploding in the trenches in the confined space they are particularly vicious, though they do not generally produce the extensive ravages produced by high explosive shells. The general infection of all the wounds may be of many kinds. Tetanus is not so frequent as at first, but the dreaded gas infection is still one of the problems of military surgery. He describes this complication, and the type of wound in which the rapidly spreading form is observed is the deep wound in which the projectile, instead of widely tearing the muscles apart, has lodged in some muscle mass, as in deep wounds of the thigh. The infection may be so intense as to overwhelm the patient in a few hours. If a soldier could keep relatively clean and could be taken at once to a well equipped hospital and cared for, the results would be better than under the condition of dirt and delay which are inevitable in this war. To combat the infection is the principal problem, and Desjardins reviews the theories and methods of Dakin, Carrel and others. He says, however, that no one method is applicable to all. The first indication is thorough exploration of the wound, removal of foreign bodies, excision of sloughs and ample drainage. At this stage continuous irrigation is of distinct value because it dilutes the discharge and facilitates drainage. The use of antiseptic solutions is advised if the wound is one that can be thoroughly made accessible to their action, in which case it does not seem to make very much difference which one of the number of antiseptics is used. At Ris-Orangis different antiseptic solutions were used on different squads of patients. There seemed to be no great difference in the power of the different antiseptics when the wounds were properly drained, but they did show that continuous irrigation should give way to dry dressings after the acute suppuration had subsided. Prolonged continuous irrigation seemed to produce edematous flabby granulations and retard the healing process. Badly comminuted fractures, complicated by infection, should be thoroughly drained and all loose detached pieces of bone removed, but pieces not thoroughly detached should be left in place. Proper treatment of fractures and bone injuries is an important part of the work of the military surgeon, and he speaks particularly of the value of the work of Drs. Joseph A. Blake, and Flint of New Haven in the use of the suspension method. Amputation should be a measure of last resort. The importance of after-treatment has been thoroughly recognized by French surgeons, and large hospitals have been devoted to it. The plastic restoration of substance in the soft parts is another important phase of military surgery, and he mentions especially the work of Morestin at the Val De Grace in Paris. The treatment of gas infection depends on the stage of the disease when first seen. If there is only a limited amount of distension, the first indication is to lay open the infected area by multiple free incisions and remove all foreign material. After ample drainage has been provided for, continuous irrigation may be tried, but if the gas crepitation continues, the limb should be removed at once. If the infection is located in the thigh, the limb should be amputated at or near the hip bone. Subfacial injections of oxygen gas or peroxid have not given encouraging results. "The greatest lesson to be learned from the surgery of this war can be summed up in two words, 'intelligent conservatism.'"

Disinfection of War Wounds by the Carrel Method, as Carried Out in an Ambulance at the Front. H. H. M. Lyle, New York. *Journal of the American Medical Association*, January 13, 1917.

The basis of the treatment is the sterilization of the wound by a suitable antiseptic reaching every portion in a sufficient concentration for a period long enough to destroy the infecting micro-organisms. The chemical destruction of the micro-organisms depends on the difference of the resistance existing between the tissues involved and the bacteria. The Carrel method enables us to secure this. The antiseptic employed is Dakin's sodium hypochlorite, 0.5 per cent. It is an ideal isotonic wound antiseptic of high bactericidal activity and low toxic or irritating quality. The latter feature distinguishes it from Javelle water, Labarraque's solution, etc. The commercial hypochlorites are of inconstant composition, and generally contain free alkali or free chlorin. They are therefore irritating and not to be used. Dakin's solution properly made has the great advantage of being able to dissolve pus, old tissue débris and blood clots, while the living tissues resist. The thoroughness of the first surgical aid is most important, and it should consist in a thorough, mechanical disinfecton and cleansing from all dirt and foreign substances. The operative field is painted with tincture of iodin, and bruised and necrotic skin edges trimmed away with a sharp knife, which is then laid aside. Fresh instruments are then used to lay the wound open like a book, and it is gently explored for shell fragments and clothing shreds, etc. Gentleness of manipulation is the keystone of the technic, and any rough handling or bruising is a crime. To avoid overlooking blood stained and encrusted débris, fragments of bone, etc., the same minute and careful technic is used in bone wounds as in the soft parts. A careful revision of the wound is made and particular attention given to perfect hemostasis, which is necessary with Dakin's solution, which has the power of dissolving blood clots. Next the instillation tubes are placed in the wound so that the liquid will come in contact with every portion. A thin layer of gauze is placed over the wound and around this the required number of tubes, secured to the wound edges by a rubber cuff and suture, or a two-way tube is used. Details are given by Lyle as to the necessary placing of the tubes. In the simple type of penetrating wounds a tube without lateral perforations is introduced to the depth of the cavity and the solution allowed to well up from the bottom. In a large tract terminating in a cavity with irregular collapsible walls, a little gauze is introduced to support the walls of the cavity and allow a more thorough penetration of the fluid. Penetrating wounds with the point of entrance in a dependent position (as the buttock, posterior surface of the extremities, and the back) are treated with perforated tubes dressed with toweling. These dressed tubes keep the antiseptic in contact with the wound. A suitable nonperforated tube can also be used. In through and through wounds, a perforated tube with the tied extremity uppermost is passed from the lower to the upper wound. The liquid, escaping through the small lateral holes, flows back along the tract to the inferior orifice, moistening the entire wound. Wounds of the hand or foot, open amputation stumps, etc., are immersed in Dakin's solution for from ten to fifteen minutes every two hours until the wound is sterilized. The skin is protected by smearing it with sterile yellow petrolatum. The gloved hands are never allowed to come in contact with the wound in dressing. The instillations of the fluid are made every two hours by releasing the adjustable clamp controlling the flow, the amount being governed by the needs of the case. When the wound has become sterile the tubes are removed and the compress moistened, and Dakin's solution applied. Formerly a continuous instillation was used. Once a day or oftener careful inspection of the wound and dressings and flow is made. Flushing the wound shows if the solution is being delivered as planned, but there is not a continuous irrigation, only a mechanical attempt to deliver a definite chemical antiseptic to every portion and to insure its contact for a prolonged period. To protect the skin from the liquid, gauze impregnated with yellow petrolatum is applied to the skin surfaces below the wound. Regular determination of the number of microbes on the wound surfaces is made by transferring on a standard loop a portion of the secretion to a slide and a count of the number of microbes in the field every second day, record being made. Absence of microbes from the wound for three successive days is considered to indicate sterilization of the wound. It is best to begin the bacterial chart one or two days after reception of the patient. Wounds of the soft parts are sterilized in from five to eight days, while greatly traumatized wounds and fractures require a considerably longer period. All bone sequestrums must be, of course, removed. When the wound has been shown sterile for three days it is closed by careful layer sutures, and for extensive wounds traction strips are used. Details of the routine method at Hospital B, American Ambulance, are given, and the results of the Carrel method were most favorable. The immediate complications became rarer and suppuration almost entirely disappeared. Lyle's summary is given as follows: "The Carrel method is not a continuous irrigation. It is not dependent on the miraculous power of an antiseptic, or on any one feature of the method, but on the combination of the whole. It is a method of sterilizing wounds by mechanically delivering an antiseptic of definite chemical concentration to every portion of a surgically prepared wound and insuring its constant contact for a prolonged period. The progress of the sterilization is rigorously controlled by the microscope. Gentleness, thoroughness and attention to detail are essential for success. I firmly believe that the adoption of this method is destined to save many lives, to reduce the gravity of the mutilations, and allow the rapid return to the front of many men who would otherwise be lost to the service of their country."

Obstetric Surgery. E. P. Davis, Philadelphia, *Journal of the American Medical Association*, October 14, 1916.

Obstetrics has been the last department to share in the general advance of modern medical science, but a considerable gain has been made in reducing the mortality and morbidity of parturition by the application of modern surgical principles. He reviews generally the history of the development of modern obstetric surgery which dates, he says, from the perfection of the classic Cesarean section when Saenger accurately closed the uterine muscle and peritoneal covering separately. This reduced the mortality and morbidity of the classical section to a rate corresponding to that of other abdominal operations. Next came the observation that patients infected during labor became so through repeated examinations after the membranes had ruptured, conveying bacteria from the vagina into the uterus. Especially dangerous are unsuccessful attempts at delivery, bruising and lacerating of tissue. When it was learned that internal examinations should be made as rarely as possible, that diagnosis during labor should be made by palpation, auscultation and pelvimetry, and that attempting vaginal delivery during labor is a serious matter, the patients were brought to section with corresponding good results. There is still a remnant of bad practice in the attempts sometimes made to deliver the unengaged head by the forceps. The views as regards the organisms living in the vaginal passages have been improved and it is realized that pathologic bacteria are liable to be found there. While obstetric surgery aims to obviate the dangers of contracted pelvis and to deal successfully with infectious foci or pathologic conditions of the pelvis or abdomen and to repair unavoidable injuries, it does far more for the child, not only saving its life, but also saving it from injuries to the nervous system that may compromise its future. Davis goes over the conditions in which surgery is called for and he asks, Do the results of modern obstetric surgery justify its existence? It is hard to estimate the maternal mortality of labor outside of institutions, but it is fair to say that it is a fraction of 1 per cent. under favorable conditions. The mortality of spontaneous labor for the child is the mortality of asphyxia. Under the general head of birth pressure also fetal mortality may result from visceral hemorrhage. As regards the fetal mortality in classic Cesarean section Davis holds that it is the most certain method of delivering a living child which exists. The high maternal mortality by the older methods of artificial delivery was about 1 or 2 per cent. and the fetal mortality following the use of forceps varies according to the mode of application. In low forceps operations at the Sloan Maternity it was approximately 10 per cent., in high operations 38.5, and the general average was 14.5 per cent. The subsequent history of the child as traced by Gaans in the Konigsburg Clinic showed instances of damage affecting future life in a certain number of cases. The fact that version and contraction are followed by a comparatively high mortality makes it difficult to compare it with the Cesarean section. Davis believes that the development of laboratory work and the use of so-called instruments of precision have led to the neglect of clinical observation and thorough studies of cases by the senses only. We rely, it would seem in his opinion, rather too much on bacterial cultures for a knowledge of the conditions of the patient than on our powers of observation. The most important essential limitation in modern obstetric surgery is the choice of those who shall practice it and practical experience is the basis of all sound judgment in deciding whether to operate and the best method of operation. The opening of maternity wards and the multiplication of hospitals will, he thinks, with the better training of medical students, produce more skilled obstetricians capable of properly performing modern obstetric surgical operations.

Pelvic Infections in Women: Comments on Some Special Pathology with Application to Treatment. Thomas J. Watkins, Chicago. *Journal of the American Medical Association*, October 7, 1916.

Since it has become known that infections, especially severe ones, are chiefly general and that recovery is largely due to systemic immunization, important advances have been made in treatment. The inflammatory exudate is no longer regarded as a destructive element, but as a conserving one. Occurrence of abscesses, especially in puerperal cases, has little bearing on the severity or duration of the infection. In non-puerperal cases the relation of suppuration to the infection is quite different, as in these cases the infective process extends along the mucosa, excites an increased secretion, and when it involves the fallopian tubes, generally produces abscesses. In one case the infection travels along the blood and lymphatic vessels and in the other a continuity of tissue, except for the bacterial invasion, which occurs in both, but more actively in the puerperium. Pelvic infection involving the peritoneum is especially favorable to the development of immunity, as the early and extensive inflammatory exudate confines some of the infective discharge and acts favorably in its destruction. Pelvic exudates, as a rule, spontaneously becomes sterile, probably due to the active reaction that takes place in infection of the pelvic peritoneum. In the puerperal case, in the absence of the localized reaction, the immunity must be mostly or entirely general and in all acute cases of pelvic infection generally immunity is probably the most important curative factor. The treatment of acute and chronic infection offers two very different problems, one deals directly with the infection, the other chiefly with its results. No specific serums or vaccines have been found for pelvic infections, diphtheria and syphilis excluded. The treatment, medical and surgical, during the acute period, is limited to aiding the defensive forces of the body. Fresh air treatment is among the most important of these, much more so than in tuberculosis. The importance of rest, sleep, food, elimination and general hygiene cannot be too much emphasized, and keeping the patient cheerful is also highly recommended. Unnecessary pain, fear and worry interfere with all other treatment. Watkins' limited experience, he says, has led him to believe that blood transfusion is very valuable in selected cases, notably in very severe, peurperal infections. In the absence of apparatus or of an experienced operator, the whole blood can be easily and effectually given subcutaneously. Recent investigations on the action of protein substances suggest their being of value in increasing body resistance. He considers that a treatment of nearly all puerperal cases should be entirely medical and that surgical procedures are usually more injurious than helpful. Mortality and morbidity have been much less since his treatment has been less surgical, and he has ceased to fear the result in puerperal infections unless they are very virulent. The treatment of nonpuerperal infection during the acute period is also chiefly medical, but in very rare instances surgical interference is indicated. Curettage, which was formerly practical largely, is not in accordance with modern knowledge and is unnecessary, and incision and drainage of inflammatory exudates is a problem for judgment in some individual cases. In his experience he has gradually lessened the number of his operations of this kind. He believes that incision and drainage should usually be limited to patients with large superficial fluctuating abscesses which can be quickly opened with local or light gas anesthesia without much disturbance to body resistance. Abdominal section is required only in exceptional cases of pelvic infecton. Inflammatory exudates may produce intestinal obstruction and call for surgical interference. Acute appendicitis complicating pelvic disease should be operated on without delay, and intestinal obstruction from exudates and tumors with twisted pedicles may necessitate interference. Suppurative and some degenerative fibroid tumors require early operation, as in many of these cases the immunity does not develop and delay exhausts the patient.

Recent Progress in the Treatment of Uterine Cancer. J. H. Jacobson, Toledo. *Journal of the American Medical Association,* October 21, 1916.

There are two factors that contribute to the belief that cancer of the uterus can be cured by other than surgical means. These are: first, its tendency to remain localized in the pelvis with metastasis only in the later stages, and second, the difference in malignancy of cancer in certain parts. Cancer of the fundus (adenocarcinoma) is the least malignant, and cancer of the cervical canal is the most malignant. Cancer of the portio vaginalis stands midway between the other two types as regards malignancy, and results of operation or any other treatment of cervical cancer are as a rule unfavorable. There are three methods of treatment that have obtained favor. One is the Wertheim radical abdominal method. Another is Svhauta's extended vaginal operation, which seems to have its special indications in obese women. Third is the heat operation of Percy which has much to recommend it in otherwise inoperable cases. The rapidly increasing literature of radiotherapy in cancer treatment reveals the fact that a new era is at hand in the treatment of uterine cancer, and it seems certain that the destruction of cancer cells is possible by the Roentgen ray. Taking all the methods into account, the best results seem to be obtained by surgical measures, especially the radical abdominal method, and the importance of early treatment is emphasized by Jacobson. He summarizes his article as follows: 1. In early or operable cases of uterine cancer, the best results are obtained from radical abdominal operation. 2. Owing to the difference in malignancy of uterine cancer, the type of cancer present should be determined whenever possible. Cancer of the vaginal portion and of the body of the uterus should be treated preferably by operation. 3. What shall be done with the borderline cases is to be determined by the operator's judgment, and his experience with the radical abdominal operation. 4. Until radium, Roentgen ray, or Percy's operation shall have proved their superiority to established methods of surgical treatment, their use should be restricted to the inoperable cases. 5. A combined form of treatment, that is, operation with radiotherapy, is a method of demonstrated value. Systematic irradiation with Roentgen ray or radium should follow every palliative or radical operation for uterine cancer.

Operative Treatment of Fibromyomatous Uterine Tumors. John B. Deaver, Philadelphia. *Journal of the American Medical Association,* October 21, 1916.

We have outgrown the older ideas as to the harmlessness of uterine fibromas and also the idea that if a woman could be tided along to the menopause it could be expected that the fibroids would then shrink and cease from troubling. He does not think that the treatment by the Roentgen ray that has been so much advocated has proved its worth. We all hoped for a time that an absolutely safe and specific remedial agency was in our reach. Now we have the claims of radium, and while Deaver is willing to grant that it has a certain direct effect, this is not specific. The Roentgen ray and radium have both a pronounced influence over malignant growths, but he nevertheless considers it malpractice to use either in any case amenable to excision. Both methods are slow and expensive and he concludes that operation, by which the patient is rid completely and finally of the growths and associated pathology, remains the ideal treatment. The operation of choice, in his opinion, is supravaginal hysterectomy. An exception should be made when the cervix is distinctly abnormal by reason of lacerations, ulceration, or inflammatory conditions, when the whole organ should be removed. Ovaries should always be left unless diseased, especially in younger women, when one ovary or a portion of it should be left unless the condition makes it dangerous to do so. It is his practice to fix the round ligament and the stump of the other portion into the cut surface of the cervix or, in the case of panhysterectomy, to the vagina on each side. Myomectomy is seldom advised, as the tumors are usually multiple and when single are apt to be so large as to render hopeless any attempt to save a functionally sound uterus. Occasionally in the case of young women it is justifiable, but it is well to remember that it may be a more complicated or dangerous operation than removal of the uterus. At times the operation of hysterotomy may come in service. It is impossible always to distinguish between a pregnant uterus and one symmetrically enlarged by a myoma. It is possible also by this method sometimes to expose a small bleeding polyp of submucous myoma. Deaver considers the operation for the fibroid tumor of the uterus one of the most satisfactory in all surgery. When cure is indicated, symptomatic treatment has no place.

A Report of One Hundred Consecutive Cases of Fibromyomata Uteri Subjected to Operation.

STEPHEN E. TRACY, Philadelphia. *Journal of the American Medical Association,* October 21, 1916.

Tracy says that criticism has frequently been made as to the lack of a life history of operated cases of fibromyomas. He has therefore made an effort to obtain recent reports of the conditions in these cases, but in a few this has been impossible. If the patient, six or more months after operation, shows a good general condition and freedom from symptoms, it is considered a cure and so recorded. The recent reports were obtained by letters from patients, personal interviews and from the family physicians. Tracy analyzes 100 cases. In thirty-one of these malignant conditions existed at operation, a larger proportion than usually reported. It is known that cancer is on the increase and surgeons are more generally using the microscope and laboratory research. We will therefore expect to find malignancy associated with the uterine fibromyomas in a larger percentage as time goes on. In this series of 100 cases, sixty-four were over 40 years of age, and he also quotes the statistics of others as regards the matter of age. Only nineteen of the 100 had no associated lesions of the abdominal or pelvic organs and no change in the tumors. In fifty-six cases there were surgical lesions in the abdomen and pelvis also. Of the 100 patients, sixty-three were married, eleven were widowed, and twenty-six were single. Of the seventy-four who were or had been married, 72 per cent. had borne children. The surgical procedures in these cases were: sixty-four supravaginal hysterectomies, twenty panabdominal hysterectomies, one vaginal hysterectomy, nine abdominal myomectomies, and six vaginal myomectomies. In every case of known malignancy, suspected malignancy and extensive cervical laceration, a panhysterectomy was done unless contraindicated. The primary mortality was 2 per cent. One patient had recovered from the operation but was still in the hospital taking medical treatment and so was counted; the other was doing well, but died from double pneumonia. In viewing the results of hysterectomy, one of the most important factors from the patient's standpoint is the amount of suffering from the artificial menopause. Careful examination as to this point and the severity of the symptoms has been made. In seventy-two patients the menstrual function was still active. Of these, forty-eight patients had no menopause symptoms. In 77 per cent. of all the cases the disturbances from the artificial menopause varied from no symptoms to mild discomfort. Of the twelve patients in whom one or both ovaries were allowed to remain, ten have been traced. In five there were menopausic symptoms. In two they were very mild, one moderately severe, and in two the symptoms were marked. Both of these were neurasthenics before the operation. In doing hysterectomy in a patient with active menstrual functions, a perfect ovary should probably be allowed to remain, but should be so placed and anchored that it cannot lie on the bottom of the pelvis and cause pain. In patients past the age of 49 years, Tracy says it makes but little difference whether they are removed or not. Of the eighty-nine patients who could be located, eleven are dead, the causes being acute mania, recurrent malignant disease, renal disease, and pneumonia. Other details are reported, but he lays special emphasis on the percentage of malignancy and the necessity of operating. No surgeon will deny, he trusts, that there is an intimate relation between fibromyomas and cancer of the corpus uteri. He cannot refrain from asking the advocates of radiotherapy, who talk about the control of bleeding as a cure, what they would hope to accomplish in the way of relieving these patients by the Roentgen-ray treatment when there are only nineteen patients in this series who had neither a malignant disease in the pelvic organs, a degeneration of the tumor, nor an associate abdominal lesion. While he admits that Roentgen surgery may help in a small percentage of cases, he still maintains that all fibromas which produce symptoms should receive early surgical treatment.

Syphilis of the Stomach.

A Clinical and Roentgenological study, with a report of 23 cases. G. B. EUSTERMAN, Rochester, Minn. *American Journal of the Medical Sciences,* January, 1917.

1. Syphilis of the stomach, though rare, is not as infrequent as is generally supposed. The aid of the Wassermann-Noguchi reaction and roentgen rays are necessary to establish the presence and the specificity of the lesion.

2. Denial of the disease, lack of evidence pointing to a primary lesion, or absence of positive Wassermann reaction does not exclude the possibility of gastric syphilis.

3. The diagnosis is based on a history of infection, a consistent positive Wassermann reaction, undisputable evidence of a gross gastric lesion, and—excluding cases showing irreparable extensive disease—a permanent cure by purely antisyphilitic measures. The diagnosis is often accidental. The possibility of syphilis should be considered in every atypical case, or in those not responding to ordinary methods of medical management.

4. The symptomatology which is fairly characteristic of gastric syphilis in view of the cases reported herewith, is suggestive of benign gastric ulcer; the gastric chemistry and roentgen findings rather suggest carcinoma. The average age of patients with acquired syphilis of the stomach is about 35; the duration of the complaint averages 3 years. In most instances the condition is characterized by an initial intermittent course, followed soon by continuous symptoms and associated with epigastric pain of variable degree, felt shortly after taking food and not relieved by food or alkalies. From the outset there is a tendency toward emesis, a variable degree of flatulency, good appetite, infrequency of hemorrhage and palpable tumor, diffuse abdominal resistance, a progressive course, and marked loss in weight without cachexia.

5. Anacidity or achylia is characteristic of the majority, if not of all, cases of actual gastric syphilis. This can be explained by the influence of the pathological process upon the gastric mucous membrane.

6. Extensive gastric involvement is frequently present at the time when gastric disturbance first becomes manifest.

7. A gummatous ulcer, usually multiple, and especially a diffuse syphilitic infiltration with variable degree of contracture (fibrous hyperplasia), thickening, deformity, and perigastric adhesions chiefly involving the pyloric segment, is the usual pathological condition. Demonstration of the presence of Spirocheta pallida in the resected tissue would be final proof of specificity.

8. Results from antispecific treatment are encouraging in all but very advanced cases. Surgical interference is indicated in certain cases. Early diagnosis and intensive treatment invariably result in symptomatic cure and structural improvement.

Splenectomy in Splenic Anemia, Hemolytic Jaundice and Hanot's Cirrhosis.

J. L. MILLER, Chicago. *Journal American Medical Association,* Sept. 2, 1916.

Miller discusses the advantages of splenectomy in splenic anemia, hemolytic icterus, and Hanot's cirrhosis. The value of the operation in splenic anemia is now unquestioned. The other two conditions have much in common with it and have no doubt been frequently confused with it in the past. In all three conditions there is an enlargement of the spleen, chronic anemia, or chronic icterus, or both. Evidence of obstructive icterus is always lacking. While typical hemolytic crises occur only in hemolytic icterus, sudden increase in anemia is not infrequent in Banti's disease. Hemolytic icterus may be definitely hereditary and often familial. This is less often the case in splenic anemia, but it occurs. Chronic jaundice is constantly present in hemolytic icterus and Hanot's cirrhosis, but it is rare in splenic anemia. The chief point of difference in the three conditions is the lowered resistance of red corpuscles in hemolytic icterus. This finding, however, is not constant. All the symptoms are compared, and it is at present impossible to explain why in

Hanot's cirrhosis there is icterus without anemia. In splenic anemia there is anemia without icterus, and in hemolytic anemia there is both anemia and icterus, though often icterus is not dominant. The classification of all splenic tumors under a general head of splenic anemia may be desirable, Miller thinks, from a therapeutic point of view, as the vast majority of patients with so-called splenic anemia have been cured by splenectomy. In the early stage of the disease the results are excellent. Mayo had only 11 per cent. mortality in eighteen cases in which he operated by splenectomy, which is the lowest record, but is not discouraging, as it is the only means offering hope of cure. In hemolytic icterus the patient suffers less except from the effect on his appearance, and Türk has referred to it as simply as a cosmetic disturbance. The degree of inconvenience should be seriously considered in suggesting operation for this condition, as it has certain dangers. Hanot's cirrhosis is a rare disease, but from its resemblance to the other two conditions it is not surprising that splenectomy should relieve it, and Eppinger and Mayo have reported cures. So far as Miller has found, these are the only reported cases; but it would appear probable that in Hanot's cirrhosis, which has heretofore been considered incurable, splenectomy was also indicated.

A Consideration of Some of the Maladies in Which Splenectomy May be Indicated. W. J. Mayo, *Lancet,* November 25, 1917.

Mayo reports 135 splenectomies with 12 deaths. He believes that splenectomy is curative in splenic anemia and hemolytic jaundice. It may be curative in certain as yet little understood conditions which are confused with pernicious anemia, leukemia and cirrhosis of the liver. Splenectomy is of value in certain types of parasitic splenomagaly, notably, malaria and syphilis. It is of value for the palliation of certain types of perniciious anemia. In portal and biliary cirrhosis associated with splenomagaly, splenectomy may have a field of usefulness, but the experiences so far are insufficient to permit of definite data being drawn. In true leukemia, splenectomy is of no avail.

Volkmann's Ischemic Paralysis and Contracture. Alfred S. Taylor. *Annals of Surgery,* January, 1917.

Clinical and experimental data point to a traumatic myositis as the main cause of Volkmann's ischemic contracture. The degree of muscle impairment varies with the amount of pressure exerted upon the muscle and its consequential degeneration with its subsequent fibrosis and almost constant contraction.

The likely complications are pressure sloughs and abscesses, nerve injuries, either primary or secondary (the latter are more frequent), and deformity.

Prognosis is unfavorable as a rule. The damage done may be much greater than can be estimated at first hand.

Treatment should aim at prevention. All injuries in children, particularly, should not be bandaged too tightly, and extreme angles of immobility should be avoided. When the contracture has occurred and when seen early, the dressing is to be removed at once, the limb elevated, and gentle passive and active massage instituted. If this is of no avail the deep aponeurosis of the flexor muscles is to be split longitudinally. However, if the condition is not observed early the operation may have to relieve the prominent deformity before any real rehabilitation of muscles can take place. Physical therapeutics combined with a method for mechanically overstretching the contracted tissues may give results better than those obtained by operation. The Jones method of rigid splints and the author's method of traction are especially valuable for treatment.

The Treatment of Fracture of the Spine.. Norman Sharpe, New York. *American Journal of the Medical Sciences,* December, 1916.

Sharpe does not believe that the conventional temporizing method of treatment of fracture of the spine is correct. He holds that early operation in all cases that show a cord lesion is indicated for the following reasons:

1. Relieves pressure from cord whether due to depressed bone or blood clots.
2. If fracture dislocation, allow cord ample room, relieving pressure effects of angulation.
3. Provides drainage of the certain edema, which by its compressive effects is destructive to the nerve fibers.
4. Allows for drainage of hemorrhage, if present, the compressive effects of which may be so great as to permanently damage the cord.
5. In skilled hands, laminectomy is not a difficult or dangerous operation, and by doing it early the surgeon has given the damaged cord the best possible chance for repair.

If the cord is found completely severed at operation, Sharpe believes suture should be attempted, for the reason that he has found that the patient suffers less from trophic disturbances than if suture is not done. The only contraindication to operation for fracture of the spine is in cases in which evidence of crushing is so apparent that a complete destruction of the bony canal is present.

Excision of the Knee Joint as a method of Treatment for Severe Infections. A. Fullerton, *British Medical Journal,* November 25, 1916.

The older methods of treatment of severe infections of the knee joint by incision and drainage have proven highly unsatisfactory in the war zone. Fullerton recommends as a substitute extensive excision of the joint with maintenance of the separation until the septic infection has been controlled. Then the divided ends of the bone are permitted to come together. The advantages of the excison are that all the various pockets in the knee joint are eliminated so that drainage is easy. Fullerton has operated 64 cases by this method, of which 6 died of the latter. four died following an amputation that was necessary owing to the failure of the excision. Amputation was necessary in 13 of the cases.

The Importance of Proper Dosage of Sodium Citrate in Blood Transfusion. Richard Lewisohn, New York. *Annals of Surgery,* November, 1916.

Lewisohn points out that the use of the minimal dosage (0.2 per cent.) of sodium citrate as a simplified method for blood transfusion is free from all toxic effect of the drug, and serves as an adequate method for the prevention of coagulation during the transfer of blood.

He shows that doses above 0.2 per cent. are likely to produce toxic and injurious effects when introduced into the circulating blood of the recipient. Weil used 1 per cent. sodium citrate, but in Lewisohn's experience this dose is excessive, and he quotes Brem to the same effect.

In a comparison of Lewisohn's method with the direct tranfusion methods of Unger, Lewisohn found both methods clinically equally beneficial. No untoward effects need be encountered if 0.2 per cent. sodium citrate be used in the blood transfusion.

Experimental Bone Tuberculosis. Nathaniel Allison and Roland F. Fisher, *The American Journal of Orthopedic Surgery,* November, 1916.

Employing dogs, these authors were able to demonstrate that it is possible to establish experimental foci of tuberculosis in any region of the bones, i. e., epiphysis, metaphysis, diaphysis, cortex of the shaft, and joint surfaces—any or all of these may be involved.

No essential differences in the reaction of the tissues to the human or the bovine type of tubercle bacillus was observed. They made out that when there are elements that lend themselves readily to new bone formation, then the tuberculosis process develops a proliferative response resulting in the upbuilding of new bone.

From their work it seems clear to the authors that there is no essential difference in the reaction to tuberculous foci between spongy or cancellus bone or compact cortical bone except that in the latter bone proliferation plays an important part.

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SOME RECENT BRONCHOSCOPIC AND ESOPHAGEAL CASES.*

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Nineteen years have passed since Killian demonstrated that a foreign body could be safely removed from a bronchus through a tube introduced between the vocal cords. It is interesting to trace the growth of bronchoscopy since that time. At the end of 1897 only five cases of successful foreign body extraction had been reported. Up to 1901 the number had reached 19; in 1904, 36; in 1906, 137; in 1907, 165; in 1909, 394; and in 1911, 595. I have not been able to get statistics for the last five years but it is safe to assume that successful extractions now number considerably more than a thousand. Killian's demonstration must be regarded as one of the great epochs in surgery for it has been the means of saving many lives. To prove this I must ask attention to the statistics of foreign bodies before the introduction of the bronchoscope. Weist, in the study of 1,000 cases, advised that, unless dangerous symptoms supervened, foreign bodies impacted in the trachea or bronchi should not be operated upon and that the surgeon should wait for spontaneous expulsion which occurred by coughing up, according to statistics of Preobraschski and Pohl, in 218 cases out of 1,064—i. e. 20.5 per cent. According to Tuffier, up to 1897, out of 11 cases of pneumonia due to foreign bodies, the supposed foreign body was on 10 occasions not discovered; in 4 of these cases operations resulted in death. Kerewsky in 1903, out of 14 cases of thoracotomy for foreign bodies, could point to only two successes.

The mortality from inhaled foreign bodies was formerly large. Among untreated cases more than 770 deaths were reported—52 per cent. As this number refers only to acute cases and does not include patients dying from lung complications due to the presence of foreign bodies, the mortality must be increased considerably.

Now let us compare these figures with the bronchoscopic period from 1900 to the beginning of 1909. Though in the early days of bronchosopy, instruments were imperfect and operators not skilled, Von Eicken shows in a series of 300 cases a very important decrease of mortality as compared with former times—13.1 per cent as against 52 per cent. For 1909 and 1910 statistics collected by Kahler showed 291 cases with 27 fatalities—9.6 per cent. The extraction of the foreign body was successful in all except 11 per cent of cases. Not a single death among the 27 could be attributed to the method itself. Among the 291 cases there were only 4.5 per cent of failures. It must be said that among the 27 fatalities, were patients who died from the effects of the long duration of the foreign body after the object itself had been extracted. No better argument of the value of bronchoscopy could be advanced than a study of the above statistics. With these preliminary remarks I come now to the real object of this paper which is a description of certain methods of examination which tend to simplify direct laryngoscopy, bronchoscopy and esophagoscopy. The mere recital of foreign bodies removed from the bronchi and esophagus is no longer of special interest to the laryngologist. What is needed is the simplification of instruments and methods of examination which will enable all throat specialists to work successfully in these regions.

The cases which I shall report will be used to illustrate certain methods of holding the patient's head and of passing instruments which will make direct laryngoscopy, bronchoscopy and esophagoscopy so easy that any laryngologist with a few weeks practice can use them successfully.

For a number of years after Killian's demonstration, the only method of holding the patient's head for passing straight tubes was almost complete extension in the sitting or the supine position. In Jackson's book on Tracheo-Bronchoscopy, published in 1906, one is struck with the extended position of the head recommended for direct laryngoscopy. In 1908 Mosher introduced his "left, lateral route" which consisted in turning the patient's head until the left cheek almost touched the plane of the table and flexing the head on the chest. The operator sat at the left of the table and introduced the special spatula between the left bicuspid teeth. The tongue was pushed to the side and the epiglottis lifted, exposing the larynx. By pushing the spatula further down the upper end of the esophagus was opened, giving a good view to the clavicle. The method was used under general anesthesia and was difficult to learn so it never became popular.

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* Read by invitation before the Laryngological Section on Laryngology, New York Academy of Medicine, November 16, 1915.

In July of the same year, I tried exposing the larynx wiith the head on the table slightly flexed but straight. I afterwards modified the position of the head so that it lay straight on the table without flexion or extension. In extension the head is always brought over the end of the table and a special assistant holds it in proper position for successful work. In the Boyce position, used by Jackson, the head and shoulders are brought over the end of the table which must be high if the operator is not to occupy a cramped position on a low stool. The straight position with the head on the table has been so satisfactory that since 1908 I have used no other in direct laryngoscopy, in passing the bronchoscope in older children and in adults, in examining the upper end of the esophagus and even in the removal of certain bodies in the esophagus and trachea.

When the method was first introduced, some laryngologists claimed that it was not possible to see around a curve with a straight tube; the answer is that in children's throats the tissues are yielding and the right angle formed by the mouth and throat can be easily made straight by manipulating the laryngoscope. In bronchoscopy and esophagoscopy extension of the head was always used until it was demonstrated that the straight position was simpler for passing the bronchoscope and for examining the upper end of the esophagus in older children and adults. In the cases to be reported I shall show that, under certain conditions, the entire trachea and esophagus can be examined with the patient's head straight on the table.

After my success with the straight position in direct laryngoscopy, it occurred to me that by elevating the patient's body and head the bronchoscope could be passed with the head straight: then, if necessary, the pillow supporting the head could be removed and the head allowed to drop to the plane of the table so that the bronchoscope could be passed without dropping the head over the end of the table thus doing away with the necessity of having an assistant to hold the head in a certain position. The first experiments with straight bronchoscopy worked well and for five years I have used no other method of passing the bronchoscope in adults and older children. The method is simpler than bronchoscopy in extension and possesses the advantage that trained assistants are not needed. The head of the patient does not leave the table. In straight bronchoscopy the operator either stands at the left or sits at the head of the table. The anesthetist controls the movements of the head. In young children the straight position is used without anesthesia of any kind. I have explained the positions at length and have compared them with extension because I shall refer to them exclusively in the case reports.

The first patient was a little girl, 23 months old, from a town in Pennsylvania, referred to my by Dr. S. Demarco with the history of having aspirated a watermelon seed. Two days before I saw her, while eating watermelon, her mother observed that she suddenly choked and had a paroxysm of coughing during which she became cyanotic. After the paroxysm she quieted down but coughed occasionally; she seemed to have some difficulty in breathing. The temperature was elevated and pulse accelerated. Examination of the chest revealed a flapping sound in the trachea which seemed to indicate that the foreign body was moving with inspiration and expiration. The patient was taken to the University Hospital and preparations were made to remove the seed. The method of operation will be described in detail because, so far as I know, it is the first time that a foreign body has been removed from the trachea with the head straight on the table. The child was wrapped securely and pinned in a sheet so that her arms and legs were practically immovable. She was then placed on the table in such a manner that the head reached to but did not extend over the end of the table. The head lay flat on the table without a pillow. An assistant steadied the head while a nurse attended to the arms and legs. Standing at the left of the table I passed my modification of Jackson's child speculum between the incisor teeth, pushed the tongue out of the way and exposed the larynx. The seed could be seen moving up and down with expiration and inspiration. I now passed Pfau's forceps between the vocal cords, seized the seed and removed it in a few seconds. The trachea to the bifurcation lay before us. No anesthetic was used. The little patient left the table unhurt and was taken home the same afternoon. I had never attempted the removal of a foreign body from the trachea with the head straight before. From this experience I believe that all flat foreign bodies too large to enter a bronchus can be removed from the trachea more quickly than with the head extended. In this case I am sure the seed was removed in less time than it would have taken to get the head in proper position for extension. It is a difficult thing to hold the head of a struggling child over the end of the table as I know from personal experience. But with the plane of the table as a point of support anyone can hold a child's head almost still.

The next case is one of unusual interest. In July, 1914 I was asked by Dr. S. K. Merrick to see M C., 6 years old, with a history of hoarseness of ten months duration. The child was well nourished and seemed in good health except for a cough and hoarseness. There was no difficulty in breathing. The family physician had seen her in September, 1913 in the beginning of her illness and had been unable to find any cause for her symptoms. The patient had enlarged tonsils and adenoids and these were removed in the hope of curing her throat. The symptoms persisted and in March, 1914 she was taken to a specialist who was unable to see the larynx with a mirror. He thought multiple papillomata were causing the hoarseness and instituted treatment accordingly. There was no improvement and in July I was asked to examine the patient with the direct laryngoscope. As is my custom with children under 8 years old, I decided to make the examination without anesthesia of any kind. The girl was wrapped and pinned in a sheet and placed on the table with head straight and held in position by an assistant. Standing at the left of the table I passed my modified Jackson laryngoscope and exposed the larynx. In the subglottic space, partly in the larynx and partly in the trachea, there was a grayish object, undoubtedly a foreign body. I should say in passing that as we entered the operating room, the father recalled that in September, 1913, the patient had swallowed an open safety pin. There could be no doubt that the pin was in the wind-pipe. The foreign body looked so inviting that I was tempted to try removal at once. I introduced Pfau's forceps and caught hold of the pin point which was up. It was my intention to draw the pin up in the laryngoscope and to coax the body out as I had done on a previous occasion with an open safety pin in the esophagus. Unfortunately the object was encrusted with salts from its long sojourn in the body and so weakened that when I grasped the pin it snapped off and the body disappeared. To my chagrin the forceps brought out one-half of the pin. I decided to do nothing further at that sitting but to rely on an x-ray picture to locate the pin which proved to be in the left bronchial tube in the seventh intercostal space. A few days later I passed the Jackson 5mm. bronchoscope and located the head of the pin. It was my intention to grasp the pin itself because of the possible danger of penetration of the bronchical wall by pulling on the head. Unfortunately I could not see the pin. By this time the bronchus was filled with blood and mucus so I was forced to give up the examination. One week later the pin had passed down to the eighth intercostal space. . Another attempt at removal failed. Each time chloroform was used as the anesthetic. The pin now passed rapidly downwards; two more attemps at removal were unsuccessful. I now decided to perform tracheotomy and to pass the short 5 mm. tube through the wound in a final attempt at removal. The patient stood the operation well and at the end of a week was ready for the final ordeal. Under chloroform anesthesia Jackson's 5 mm. tracheoscope was passed through the tracheal wound into the left bronchial tube. To my amazement no trace of the pin could be seen though the terminal bronchi came into view. While still asleep the patient was subjected to another *x*-ray picture which showed the pin in the ninth interspace. I passed the tracheoscope the second time and carefully examined all the terminal bronchi. One of the anterior branches was closed by swelling of the membrane at the opening. I devoted my attention to this particular bronchus and requested the anesthetist to allow the patient to wake sufficiently to cough which I knew would open the bronchus temporarily. When the cough came the bronchus opened and I saw the head of the pin. I now passed forceps through the tube and used them as a dilator to push the swollen membrane aside. It was then comparatively easy to grasp the head of the pin and to remove tube, forceps and pin together. The patient had some reaction but was well enough to go home at the end of the week. She has since remained well. When the pin was removed it was placed on the table. When I picked it up a moment later the pin broke off close to the spiral. We were thankful that this happened outside of the trachea for if it had broken during removal it would have passed down into the lung and caused the death of the patient. This case is interesting for several reasons. First, the long sojourn of the pin in the body which caused it to become brittle, increased the danger of removal and prevented my getting it at the first operation. I was afraid to pull on the head for fear of puncturing the bronchial wall. For this reason I was anxious to grasp the broken pin: I was unable to do so because I could not see it. Second, the rapidity with which the pin traveled down was unusual because the left bronchus in a child of six years is small and it seemed impossible for an open safety pin to pass into a terminal bronchus. Third, the attempt to remove the pin from the subglottic space without a general anesthetic was bad judgment. I believe, however, that the attempt would have been successful if the pin had not been brittle. This case illustrates the difficulties with which one is liable to meet in tube work aand proves that success in this branch of surgery depends not upon fixed rules but upon the ingenuity of the operator.

The third case illustrates straight direct esophagoscopy. Since 1908 I have used the straight method for diagnosing diseased conditions and removing foreign bodies from the upper end of the esophagus in children without anesthesia. The position of the head and the instrument are the same as for direct laryngoscopy and the examination is as easily made. In adults under general anesthesia the laryngoscope is passed with the head straight on the table. If, however, the entire esophagus is to be examined, I have heretofore dropped the head to the plane of the table and passed the esophagoscope in extension. In the case to be reported a foreign body was removed from below the clavicle with the head straight. I believe the straight method will work with all flat objects for the reason that they practically always lie in the posterior plane of the esophagus and the esophagoscope passed with the head in extension is liable to slip over or above the object with the result that it is found with difficulty and after prolonged search. With the head straight all muscles are relaxed and the posterior wall of the esophagus is in clear view. The patient was a woman, 26 years old, who, while chewing her food, had the misfortune to break her hard, rubber tooth plate into three pieces. The central, suction part disappeared down her throat. She consulted a physician who made light of the accident and advised a dose of castor oil. The next morning difficulty in swallowing induced her to see her family physician who told her of the seriousness of the trouble and advised an *x*-ray picture. She did not accept the advice but decided to wait a day or two. Two days later pain and temperature developed. She then had a picture made which showed the plate in the esophagus below the clavicle. The accident happened Sunday morning; Thursday afternoon under ether anesthesia I examined the upper end of the esophagus and then passed the esophagoscope with the head in extension with the result that I missed the foreign body. The next afternoon the patient was again etherized. I then proceeded to examine her as follows: The head was held straight on the table. Jackson's large separable speculum was used to expose the upper end of the esophagus. The 7 mm. bronchoscope which has a pointed end was passed through the speculum and easily slipped into the esophagus. I now found that posterior esophageal wall was in plain view and I had no difficulty in locating the plate which was in the posterior plane of the esophagus. As an experiment I passed the esophagoscope over the plate and examined the esophagus as far down as the tube would go without extending the head. With forceps introduced through the bronchoscope I seized the plate and gradually coaxed it out. The patient left the hospital the next day.

The next case illustrates the danger of putting things in the mouth. A boy, 9 years old, placed a .32 caliber empty cartridge shell in his mouth and when his teacher spoke to him swallowed it with the result that he nearly choked. He became cyanotic and had a severe coughing spell. After a time he quieted down but was so weak he had to be taken home. He continued to cough and soon developed a high temperature. His breathing was interfered with. The parents not realizing the seriousness of the case did not call in a physician until 48 hours later. He advised immediate removal to the University Hospital. When I saw the patient his temperature was 104 degrees, pulse 140 and respiration rapid and labored. The respiratory murmur on the right side was diminished. An *x*-ray picture showed the shell in the right bronchus with the open end up. At 8.30 o'clock that evening the boy was placed on the table with head and body elevated on pillows. He was etherized and the 7 mm. bronchoscope passed with the head straight. The pillow under the head was then removed. The bronchoscope was quickly passed into the right bronchus with the exposure of the foreign body. Forceps introduced through the tube grasped the shell but repeatedly slipped off. Finally a good hold was secured and shell, forceps and tube pulled out together. Just as the larynx was reached the foreign body was lost aand the boy became cyanotic and stopped breathing. It looked as if his trachea would have to be opened but a finger on the larynx pushed the shell down after which breathing was quickly restored. The bronchoscope was again passed and the shell found in its original position. The forceps again slipped and it was some time before a hold was secured and the foreign body removed. The next morning the boy's temperature was 99 degrees and pulse and respiration were lower. From this time recovery was uneventful.

In January, 1915 W. J., 16 years old, was referred to me by Dr. John Dunn of Richmond. His trouble was dyspnea which had grown progressively worse for ten months. Dr. Dunn had diagnosed a tumor of the trachea with the mirror. There was no difficulty in seeing a white mass at about the sixth tracheael ring with the mirror. The 7 mm. bronchoscope was passed under local anesthesia with the patient sitting and the tumor examined. It was irregular in shape and took up about half the space in the trachea. Forceps were introduced and the tumor removed as well as possible. After the operation no remains of the growth could be seen. Alcohol was applied to the wounded surface. The boy was kept in the hospital a month and repeatedly examined but no recurrence was seen. He was then allowed to go home apparently cured. There has been no recurrence. Pathological examination showed a papilloma.

Recently I have had another opportunity to use straight bronchoscopy and esophagoscopy. The patient was a female, 62 years old, with a short thick neck. Such subjects are considered difficult for any form of tube instrumentation. Because the patient was nervous and because of the extensive examination to be made for diagnostic purposes, it was thought better to administer ether. After anesthetization I passed the large Jackson laryngoscope and quickly exposed the larynx which was normal. I then passed the 9 mm. bronchoscope through the short tube between the vocal cords into the trachea. With an assistant holding the bronchoscope, I removed the laryngoscope and pushed the long tube into the right bronchus exposing the terminal bronchi. All the time the head lay straight on the table; the exposure of larynx, trachea and bronchus was perfect and more easily performed than with the head extended over the end of the table. From this experience with two patients I believe it is possible to do bronchoscopy under general anesthesia in some adults and older children with the head straight. The next step was the exposure of the upper end of the esophagus which was done by pushing the large laryngeal speculum down behind the larynx and lifting it. The esophagus opened up for at least an inch and a half and one could study it at leisure. The 7 mm. bronchoscope which has a projecting end was now pushed through the laryngoscope into the esophagus under the guidance of the eye. The walls of the esophagus were examined as the tube was pushed down. With surprising ease the tube passed down as far as it would go. A 10 mm. tube would have worked equally as well. Both esophageal examinations were made with the head straight on the table; larynx, trachea, bronchus and esophagus were seen by the doctors and nurses present. I feel now that straight bronchoscopy and esophagoscopy can be used successfully in many patients in whom formerly extension of the head over the end of the table would have been considered a necessity.

The last patient upon whom straight esophagoscopy was used successfully was a woman, 25 years old, who, while eating soup, swallowed a bone which the *x*-ray located in the esophagus two inches below the clavicle. Under ether anesthesia with the head straight on the table, I exposed the upper end of the esophagus with the Jackson, large, separable speculum. I then passed the 9mm. esophagoscope through the speculum into the esophagus. The bone was promptly located and shown to doctors and nurses present. It was seized with forceps and drawn up with the esophagoscope. At the upper end of the esophagus it slipped from the forceps and was lost and the most careful search did not reveal it. I decided to have another *x*-ray picture made and to go after the foreign body again the next day. Two hours later the patient was nauseated and, during an attack of vomiting, the bone came up. In this case the ease of examining the esophagus with the head straight on the table was again demonstrated. The fact that the patient had large teeth was no disadvantage in passing the esophagoscope and exposing the bone. In three successive cases under general anesthesia straight direct esophagoscopy has worked admirably.

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EXPERIENCES IN ESOPHAGOSCOPY.*

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To attempt to review in a short article the subject of esophagoscopy in all its phases would be an impossible task. I shall therefore limit myself to a consideration of some of the experiences I have had in the use of the direct esophagoscope which are of special interest and importance to the general practitioner.

The question has often been asked whether an esophagoscopy is a dangerous procedure. Now, it could be said that the passage of a straight tube into the esophagus and down its entire length as far as the cardia is not in itself a dangerous procedure; not a single drop of blood is lost, nor is any injury of any kind sustained by the patient. But, in making the statement, I assume that the esophagoscopist is one who is thoroughly familiar with the anatomy of the throat and the esophagus, and is accustomed to handling these parts in the living; and, that he possesses the keen insight, the steady hand, and the manual dexterity which constitutes what is termed technical skill. And, I can also say that the art of direct esophagoscopy has been brought to such a degree of perfection that many accidents that formerly occurred need no longer be feared. But, on the other hand, esophagoscopy is always performed with some definite object in view, and the dangers which are often ascribed to this manipulation are due to the nature of the case and the character of the operative procedures which must be performed with its aid. Under these circumstances an esophagoscopy may, in individual instances, be a very dangerous procedure.

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* Read before the Metropolitan Medical Society, December, 1916.

In an infant, with a smooth foreign body like a coin, recently swallowed, no anesthetic at all need be used. In adults, local anesthesia usually suffices. When the foreign body is a difficult one to remove, like an open safety pin, or if it has ulcerated the wall of the passage, or is buried in a mass of granulation or scar tissue, a general anesthetic may be needed.

For ordinary diagnostic or therapeutic purposes, local anesthesia of the pharynx suffices. But if the patient is restless and intolerant of the manipulations, the use of morphine in full doses, one-half hour previous to the operation, is advisable. Only in exceptional cases is a general anesthetic needed.

Esophagoscopy is performed for the following purposes: (1) The removal of impacted foreign bodies; (2) The diagnosis of disease of the esophagus, in which is included the removal of specimens for microscopic examination; (3) The treatment of esophageal disease.

The Removal of Foreign Bodies:

In considering this question, I wish first to call attention to the fact that among the laity, at least among the ignorant laity, the difference between swallowing and inhaling a foreign body is not understood, and they should be instructed on this point. In obtaining the history of such cases it is of the utmost importance that a clear distinction should be made. Not only the laity, but the physician himself, may not be clear in his statement of the facts. An incident illustrating such an error occurred recently when a physician brought a child to me with the statement that the child had swallowed a chicken bone, and that he had felt it in the esophagus with his finger. I performed an esophagoscopy, but failed to find the foreign body. I instructed the doctor to watch the child, and if it developed a cough we would look for the foreign body in the lungs. A few days later I removed the chicken bone from the right bronchus.

Other errors might be mentioned, for instance: an adult stated that he had swallowed a piece of bone while eating beef-stew; he said that the bone, when it became lodged in the throat, made him retch and vomit so that he dropped his plate of false teeth into the toilet seat. What really happened to him was that he broke his plate in two, that he dropped one-half of it into the toilet seat and swallowed the other half. On the other hand, a careful investigation of even a questionable story of this kind will occasionally bear fruit. For instance: a child was left by its nurse for a few moments; when the nurse returned she found the child had pulled off its stocking and the safety pin with which this was fastened had disappeared. A careful search failed to reveal the safety pin. The child was apparently in good condition and took its bottle without difficulty. Nevertheless, the mother consulted a physician, who fluoroscoped the child and found the safety pin lodged open, with its point directed upwards, in the upper part of the esophagus. When a story of this kind is disregarded the result may be most unfortunate.

A few years ago a patient was brought to the Mt. Sinai Hospital, on the service of Dr. Emil Mayer, in a moribund condition from starvation, with a history of having swallowed some months previously a piece of lead to which a long wire was attached. Although I succeeded in cutting the wire and removing the foreign body, the patient nevertheless died within twenty-four hours. Another child was brought to the hospital last summer because it was vomiting blood. He had been coughing for four weeks. The presence of a foreign body, a collar button, in the neighborhood of the aortic arch, was disclosed by the *x*-ray. In my absence, my adjunct, Dr. Kaempfer, attempted to remove this foreign body, but the condition of the child became so bad during the manipulation that he was compelled to desist. Fortunately for him he was wise enough to desist, for the child died that night, and when I passed the esophagoscope upon the body the next day, I found the following condition: At the level of the aortic arch there were numerous blood clots in the esophagus and upon removing these a perforation of the esophageal wall was found. The esophagoscope was passed through the perforation and into a cavity from which numerous blood clots, two to three inches long, were extracted, and from which quantities of serum escaped through the esophagoscope. When the body was turned upside down the blood and serum poured out in a stream. While removing the clots the forceps came in contact with the foreign body which was then extracted. It was possible to pass an instrument into this cavity almost to the diaphragm.

Under any and all circumstances the removal of a foreign body at as early a date as possible is an important necessity. If the foreign body is smooth and round, like a coin, and particularly when it is lodged in the upper part of a child's esophagus, its removal is accomplished in a few seconds without anesthesia, and without risk to the child. But a foreign body which has been impacted, which has ulcerated into the walls of the esophagus, and which is surrounded by granulation tissue, may require several attempts and complicated manipulations which, owing to the inflamed condition of the esophagus, becomes very dangerous and under these conditions, it is my opinion that the esophagoscopy should be done under general anesthesia. As a rule, a foreign body which is lodged in the esophagus can be found without difficulty, but even here we may fail. A large, white pearl button which could be distinctly seen in the radiograph near the cardia was not found at the first attempt to remove it, but was removed in a few minutes at the second attempt; while a case of special interest is that of a woman who consulted me because she had swallowed a piece of bone which I found had lodged in the posterior wall of the esophagus just behind the cricoid cartilage. It was readily removed, but the patient returned a few days later stating that the bone was still there and, upon examination, a second piece of bone was found in the right pyriform fossa, which seemed to be a very small piece, but upon grasping it with the forceps a piece of bone 1½ cms. long was extracted from a wound in the mucous membrane.

The Diagnosis of Diseases of the Esophagus:

The extraction of foreign bodies is only one of the uses to which the esophagoscope may be profitably applied. As indicated by the few cases above recited, it is occasionally necessary to pass the esophagoscope to make the diagnosis of the presence of a foreign body, and in the same manner various diseases of the esophagus not only can be recognized with the aid of the esophagoscope, but this instrument enables us to make the diagnosis with a degree of accuracy which no other method affords, and to study the detailed conditions of the diseased process in a manner which cannot be studied in any other way. The most important disease in which the use of the esophagoscope is necessary to place the diagnosis beyond doubt is carcinoma, for it is only by microscopic examination of specimens removed from the growth that a diagnosis can be established with certainty. Sarcoma, lues, and tuberculosis of the esophagus will give a clinical picture which is not always easy to distinguish from carcinoma, and even stricture of spasmodic origin may simulate carcinoma so closely that an experienced surgeon may be led into error. In a case which came under my observation recently thoracotomy had been performed only to reveal a perfectly normal esophagus. In this case a stricture, due entirely to spasm, without any disease of the esophagus, either in the neighborhood of the stricture or elsewhere throughout its lumen, was found. The obstruction was in the neighborhood of the aortic arch. The spasm was so powerful as to prevent the passage of the esophagoscope under local anesthesia, except with the aid of complicated manipulations, but when the patient was esophagoscoped under general anesthesia, no sign of the stricture could be seen.

The importance and value of the esophagoscope, even when the diagnosis seems evident by ordinary methods, is further illustrated by the following case: A woman of forty-six who had been an invalid for many years and who was in an extremely neurotic condition when I saw her, had complained for two years of pain in her throat and difficulty in swallowing. She felt a lump in the throat which moved up and down, and which was regarded as a globus hystericus. She stated that she was unable to swallow solid food, but could swallow liquids, but her husband declared and the patient admitted that this difficulty in swallowing was not continuous, but that at times when her attention was called away from her throat, she was able to eat and swallow any kind of food. She had been treated by various laryngologists who made applications to her pharynx and larynx, but the patient declared that she was worse after each treatment. She was one of those exceedingly nervous individuals who, when you approach them with a tongue depressor, immediately have spasmodic contractions and contortions of the lips, cheeks, tongue and pharynx, and in whom an ordinary inspection of the pharynx is attended with insuperable difficulties. There was no doubt in the mind of her physician that the woman was hysterical and nothing more; she made the same impression upon me and upon all who saw her. Yet, she was so persistent in her complaints regarding her throat that we decided upon an esophagoscopic examination under general anesthesia in order to determine definitely whether the woman had any reason for complaint. Upon raising the cricoid cartilage with the esophagoscope I was greatly surprised to find a well-developed cauliflower growth which had the macroscopic appearance of a carcinoma, and which proved upon microscopic examination of the specimen to be such.

Strictures of the esophagus affords an interesting series of cases for esophagoscopic diagnosis. In strictures resulting from the ingestion of caustics the location, direction and position of the scar, and the direction of the passage through them can be determined with accuracy only upon esophagoscopic examination. The dilatation of tight strictures by the blind method is attended with numerous dangers, but when dilatation by means of filiform bougies or mechanical dilators is performed through the esophagoscope, the operations are attended by practically no risk. Neither radiograph nor blind bougie can differentiate with accuracy the character of the esophageal obstruction; for these methods can tell us only in a general way the size and shape of the passage, but when the stricture is tight and only a smooth filiform can be passed, if any can be passed at all, the use of force by the blind method is unjustifiable. With the esophagoscope, however, the stricture can be seen and felt, and the possibility of treatment determined.

This is well illustrated in a case which came under my observation about a year and a half ago of a woman who for three years had difficulty in swallowing. There was a syphilitic history. An attempt to pass the esophagoscope met with obstruction just at the level of the cricoid cartilage. A small lumen a few millimeters in diameter was found on one side. The obstruction was caused by an adhesion of the cricoid cartilage to the posterior pharyngeal wall, forming a web-shaped stricture. I found that by means of a suitable instrument the adhesion could be broken down, and when the lumen was made large enough for the esophagoscope to pass, the tube itself was used to complete the separation. There was no other obstruction and immediately thereafter the patient was able to swallow all kinds of food. Following this we began the passage of a large-sized esophageal bougie, about one inch in diameter, No. 43, and this has been passed at intervals ever since. The patient has had no further trouble from her obstruction.

Cancer of the esophagus presents a very variable appearance, sometimes assuming the form of an ulceration with thickened edges, at other times the appearance of a polypoid or cauliflower growth. It is practically impossible to differentiate carcinoma from sarcoma, or even from some forms of tubercular or syphilitic ulceration by the gross appearance alone. But the removal of specimens for microscopic examination, when carefully performed, is neither dangerous nor harmful. Examination of patients with carcinoma by this method is not dangerous, provided the patient is tolerant and permits the passage of the instrument without undue resistance or restlessness. If the patient is not tolerant, the administration of morphine in full doses an hour or so before the operation will be of material assistance, but if with the aid of cocaine and morphine the patient does not permit the examination to be made, it is wiser to desist and to place the patient under general anesthesia.

When a pronounced lesion of the esophagus is seen through the esophagoscope, *it should be an invariable rule not to make any attempt to pass any instrument beyond the growth.* Specimens can often be removed while the end of the tube is still a few centimeters *above the growth itself.* As long as the tube remains in contact with normal mucous membrane only and the patient is quiet, there is no danger of serious injury. But the portion of the esophagus occupied by an ulceration or a new growth is apt to be very fragile, and any attempt at instrumentation is likely to lead to serious consequences. Little can be gained by such attempts. *It should also be a rule in passing the tube for diagnostic purposes never to use an obturator or a mandrin for the introduction, but this should be carried out under direct vision.* In this way the presence of a lesion can always be determined before the instrument itself has come in contact with it.

It is not difficult to recognize the various lesions that may be seen within the esophagus such as ulcerations, patches of dilated veins, etc. As an illustration of the accuracy with which alterations in the mucous membrane may be recognized, I shall quote the case of a patient who had complained of pain and swelling in the neighborhood of the sternal notch. Examination with the esophagoscope revealed the presence at this point of a raised area, darker red than the surrounding mucous membrane and of a velvety texture. A specimen removed from this region showed that it was one of those rare instances where instead of squamous epithelium there are patches of cylindrical ciliated epithelium in the esophagus itself.

The treatment of the various diseases of the esophagus can be carried out at times with much satisfaction, and I may here cite a case referred to me by Dr. Willy Meyer, a patient with cardiospasm, upon whom Dr. Meyer had performed first a separation of both vagi from the esophagus (bilateral vagolysis) followed by esophagoplication, and second a plastic operation for the enlargement of the cardiac orifice. Esophagoscopy was performed some time after the operation, and I found, upon reaching the neighborhood of the diaphragmatic hiatus, that the esophagus made a sharp bend toward the left. A soft rubber tube could be passed through this bend, but the straight instrument could not be advanced, for the tissues in this region were dense and rigid. A special instrument was constructed by means of which I was able to straighten out this bend after a number of sittings, so that I was then able to pass the esophagoscope into the stomach. I then found that one of the silk sutures which had been placed in this region at the time of the second operation was still present. Its entrance and exit into the esophageal wall could be distinctly seen, and the knot was found to be still firmly tied. In order to remove the suture it was first necessary to cut it. After the removal of the stitch the dense infiltration of the mucous membrane promptly disappeared, and the esophagus has remained straight since. I have passed the tube into the patient's stomach at frequent intervals since then and he is gradually learning to swallow his food.

THE ARTIFICIAL RESTORATION OF LOST OR MISSING TISSUES IN CONGENITAL CLEFT PALATE—A NEW DEVICE.*

Vethake E. Mitchell, D.D.S.,
New York.

While the employment of mechanical appliances for cleft palate is not new, the appliance here illustrated and worn by patients who will demonstrate it, is *new* in principle.

This is the principle: *By restoring artificially all the missing tissue to as nearly a normal condition as possible, we restore the defective speech mechanism, permitting its normal function.*

There are two reasons for attempting to correct this defect, either surgically or mechanically: First, the improvement of the general health; and second, the improvement of the voice and speech. Nature intended that we should have separate channels for the air we breathe and the food we eat. We know that this is so because of the difference in the anatomical formation of these cavities. Provisons are made in the nasal passages for the warming, moistening and filtering of the air before it passes into the lungs. The oral cavity does not supply these requirements.

On the other hand, the highly sensitive mucous linings of the nasal passages are most unsuitable for the passage of the different foods. In cleft palate cases some food necessarily passes through a part of the nasal passages, and by constant irritation produces a catarrhal condition of these tissues, and provokes the secretion of a viscid mucus which contaminates the air breathed and the food eaten by these patients. But this is not all: These unfortunates are conscious that their defect is announced whenever they attempt to speak. This has a deplorable effect upon their physical and mental development.

Again, the palate is one of the most important organs of speech. Its functions are concerned in forming the tone of the voice by regulating the shape and size of the resonance chambers, and to close off the nasal passages in the emission of certain sounds. This being impossible to a greater or lesser extent in cleft palate cases, speech is very defective and gives it that peculiar quality which all can recognize.

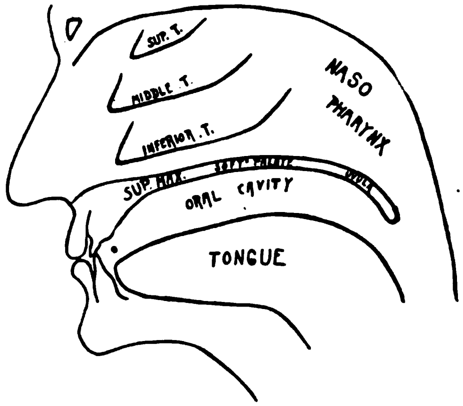

Figure 1. Sagittal section through nose, pharynx and mouth, showing the resonance spaces.

To understand more fully the tissues involved and their functions, let us refer to the drawings:

Figure 1 shows the nasal cavities with the turbinated bones, superior, middle and inferior, on either side, each forming a resonance space and, when separated by the septum, with the hard palate beneath, forming six distinct resonance spaces.

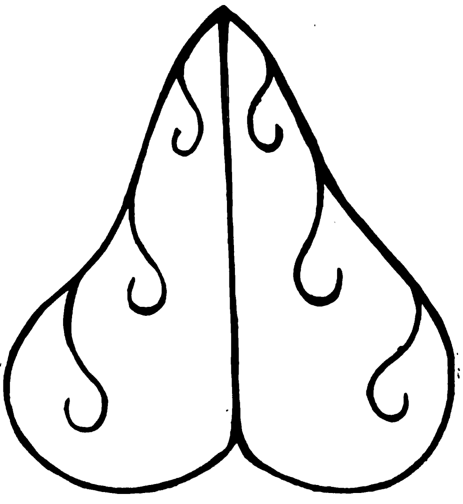

Figure 2. The six nasal resonance spaces formed by the turbinates.

Figure 2 shows these spaces better.

Figure 1 shows also the large naso-pharynx, another resonance cavity, regulated as to size and shape principally by the soft palate and uvula.

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* Presented at the meeting of the Surgical Section of the New York Academy of Medicine, January 5, 1917.

Here can be seen also the oral cavity, still another resonator, with the tongue, soft palate, lips and teeth—all concerned in the production of voice and speech.

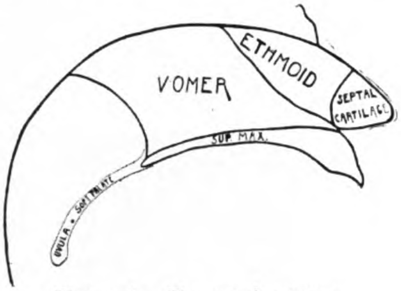

Figure 3. The nasal septum.

"The cartilage of the septum is a smooth, triangular plate inserted posteriorly into a groove in the perpendicular plate of the ethmoid bone. Anteriorly where it is thicker, it is connected with the nasal bones and adjacent lateral cartilage, and below with the vomer and palatal processes of the superior maxillary bones. The septal cartilage separates the anterior portion of the nasal cavities. The inner wall is the smooth septum formed principally by the perpendicular plate of the ethmoid bone, the vomer bone and the septal cartilage."

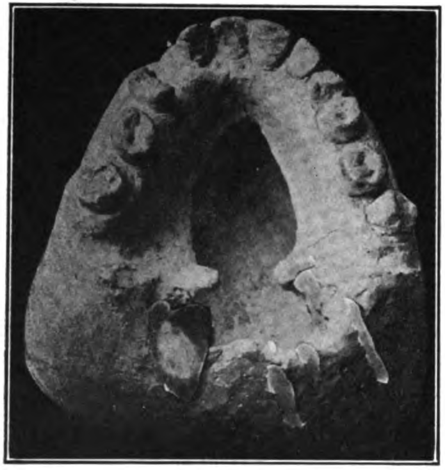

Figure 4. Plaster cast in a case of cleft palate. Showing absence of vomer, hard and soft palate.

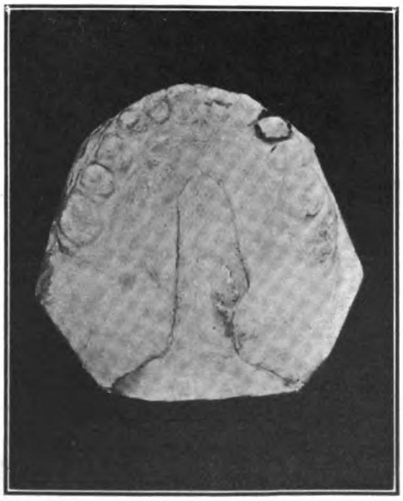

Figure 5. Model of the mouth of a girl of 13.

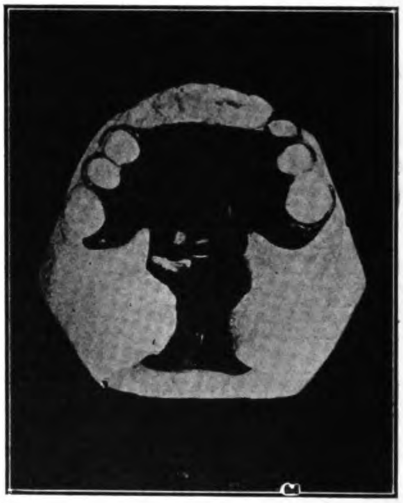

Figure 6. Appliance in position on model.

Figure 3 shows the septum of the nose.

Without any question, surgical closure of the cleft is the ideal method of treatment, *when it is possible to restore the function of the tissues.* But as Dr. W. J. Roe, of Philadelphia, says: "The closure of the cleft, even if surgically successful, un-

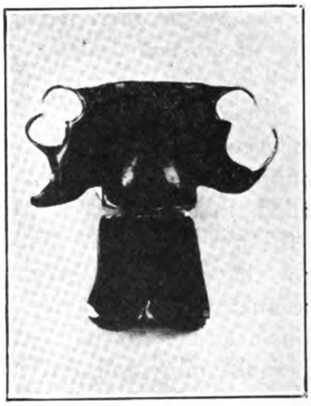

Figure 7. Palatal view of appliance.

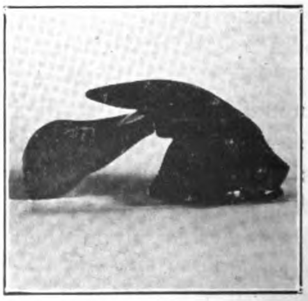

Figure 8. Side view of appliance.

less it restores the functions of the tissue, invariably leaves the patient worse off than before, and also frequently prevents satisfactory subsequent treatment."

These conditions led me to make a special study of mechanical means by which these patients could be helped, especially those of the adolescent or adult age.

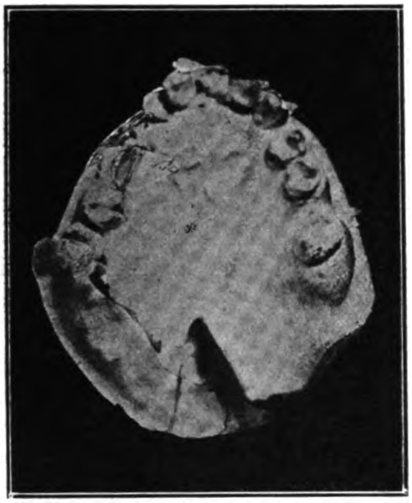
Figure 9. Model of cleft involving only the soft palate.

Appliances of many shapes and of different materials have been devised for the closure of the cleft, but with apparently little regard for the restoration of the nasal passages, to permit normal respiration, or the restoration of the resonance chambers for the improvement of voice and speech.

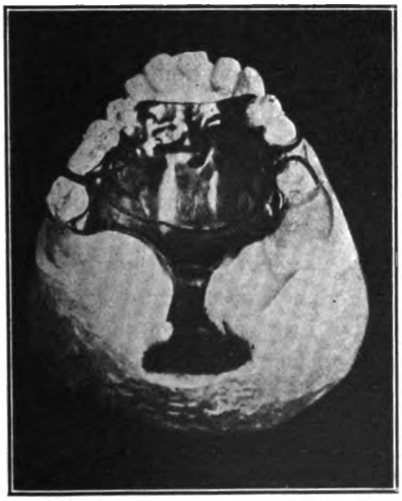
Figure 10. Appliance on model shown in Figure 9.

With the vomer and the soft and hard palate missing, as in Figure 4, one can readily see the impossibility of shaping the resonating chambers to produce the proper sounds.

The oral and nasal cavities are practically one chamber.

In restoring this condition, the missing hard palate and vomer are reproduced in hard rubber, fastened rigidly to a supporting metal plate, which is firmly clasped to the teeth.

This restores the nasal passages as well as the roof of the mouth. This I believe is the first attempt, either surgically or mechanically, to restore the vomer bone.

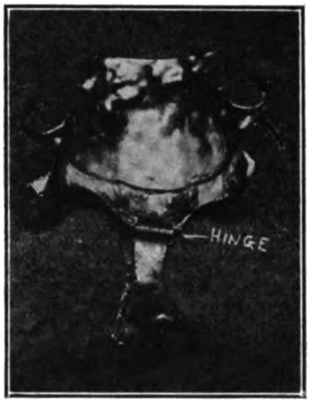

Figure 11. Palatal view of appliance shown in Figure 10.

The soft palate is the most important organ concerned in the shaping of the resonance chambers. Its muscular activity, while delicate, has quite a range of movement. To accomplish this in the artificial piece, the palate portion, also made of hard rubber, is attached to the posterior border of the hard palate by means of a specially constructed hinge. It is shaped to fit the cleft and has thin flanges on either side to rest upon the upper surfaces of the remaining palatal tissue.

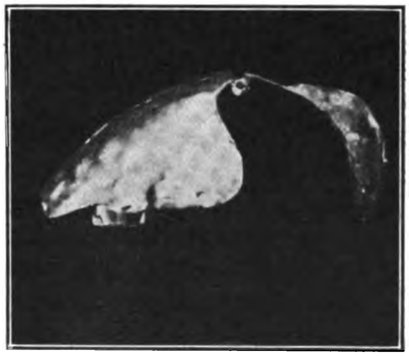
Figure 12. Side view of appliance shown in Figure 11.

Let it be understood that the appliance restores only the mechanism; improvement in voice and speech comes through persistent co-operation of the patient and instruction by a thoroughly competent teacher.

My patients have been very fortunate in being able to receive this instruction through the Miller Vocal Art Science organization, founded by Dr. Frank E. Miller and conducted by Miss Adelaide Gescheidt, his only exponent, and her staff of assisting teachers.

Patients are trained through the principles of the "sevenfold pathway of voice," of Miller Vocal Art Science procedure—to co-ordinate the muscles of the body and harmonize its sympathetic nervous system. This brings about a perfect equilibration of the forces of the body and finally results in an automatic control of speech, voice and correct diction.

Three patients were presented, to show the possibilities in the improvement in speech and voice, by the aid of this appliance and proper instructions.

First patient, a female, seventeen years of age; has been wearing the appliance about one year, and has had instructions for six months.

With the appliance in place (figures V and VI) she demonstrated her ability to use her restored voice mechanism,

First, by *"buzzing the card"*:

This is a unique exercise, used to develop the breath control and certain phases of the voice. She is now able to blow a steady flow of breath through the lips.

Second: She repeated the Miller Vocal Art Science scales of vowels and consonants, showing the automatic usage of the speech muscular adjustments.

Third: She sang a song entitled "In the Time of Roses."

This showed her ability to enunciate almost perfectly, and also the resonance of the voice.

Second patient, female, about 25 years of age, had worn the appliance for about a year and had eight months' instructions.

She recited some very difficult words and phrases, also a short poem.

Third patient, girl, age 12 years. Had worn the appliance for about two years and had instructions for about six months. She recited many difficult words and a short poem.

This girl was unable to make herself understood before she had the appliance and the instructions. After two months, her diction became almost perfect, and she now is able to sing songs well, although she was utterly without sense of pitch or tone quality at the beginning.

17 East 38th Street.

FOCI OF INFECTION IN THE EAR, NOSE AND THROAT.

Frank Albert Burton, M. D.,
San Diego, California.

The aim of this paper is to discuss the very great, and sometimes vital, importance of ear, nose and throat sepsis, as well as to consider preventive measures, prompt detection and early removal of foci of infection, to suggest the importance of a closer relationship between the dental and medical professions, as well as that of those engaged in the different departments of medicine and surgery.

There is very little in text-books on focal infection, and possibly at first thought one might presume this subject could be adequately dealt with in a brief paper. In my opinion, however, it should be said that hours would be necessary for the reading of a paper giving the results of the interesting and valuable investigation that has been made along this line, especially during the past three years.

As early as 1886, Chapin of New York made the observation that "rheumatism in children seems to have a tendency to attack mucous as well as serous surfaces, especially the tonsil;" and added, "it may seem somewhat forced to seek any relationship between throat, and especially tonsillar affections, and rheumatism, and yet they occur frequently enough to suggest the possibility of some connection besides a mere coincidence."

About twenty-five years ago Dr. W. D. Miller showed that septic conditions of the mouth caused constitutional diseases.

Despite the fact that these men called the attention of the dental and medical professions to the possibilities of constitutional conditions, resulting from mouth and throat sepsis, we are told that less than four years ago the presentation of oral sepsis before the Pennsylvania Dental Society brought no discussion, so little was the interest in the subject. And about two years have passed since the subject of septic inflammation of the faucial tonsils causing so-called rheumatism, presented at the Pennsylvania Clinical Association, brought out the denial by certain of its members that polyarthritis could be caused by a septic tonsil.

The present wave of enthusiasm and large degree of interest in focal infection on the part of dentists and physicians is partially due to a careful review of the literature, but in no small measure to the most gratifying results following the removal of septic foci.

During the past three or four years clinicians, pathologists and bacteriologists, with the thoroughness of even animal experimentation, have accumulated such convincing evidence that serious constitutional conditions may result from very small septic foci in mouth and throat that it would seem that no skeptics could still remain. It has been known for some time that septic foci in parts remote from the heart, e. g., abscess around an ingrown toe nail, may cause endocarditis. In the *New York Medical Journal,* April, 1916, Deland reported a case of furunculosis and carbuncles resulting from pyorrhea. This case was observed about fifteen years ago and marked the beginning of his study of the relationship of oral infections to constitutional diseases. For several years Deland has made a careful investigation of the mouth as a part of the routine of his examination of every patient. If endocarditis may be caused by an abscess around an ingrown toe nail and if furunculosis may result from pyorrhea, is it not reasonable to presume that this and allied conditions might result from septic tonsils or pus in the middle ear, mastoid or accessory sinuses?

During the past year or two a large number of cases of so-called rheumatism, rheumatoid pains, muscular rheumatism, swollen joints, etc., have been relieved by the removal of septic oral foci, especially of tonsils and teeth. The results have been so prompt, so favorable and so far reaching that one hesitates to tell all for fear of being thought unreasonable and over optimistic. However, it should be said that indescriminate removal of tonsils and adenoids without sufficient symptoms should be avoided. It is the consensus of opinion of leading laryngologists that the function of the tonsil is that of protection of the respiratory and digestive tracts in early childhood, but if sufficiently diseased it can no longer perform its function and only becomes a menace to the health of its possessor. Unless diseased, nature begins the process of absorption of the tonsil when the child is approaching puberty, usually when about 9 or 10 years of age; and if not diseased when the individual has reached about the eighteenth year the tonsil has disappeared. If diseased and fibrous the tonsil is not capable of absorption.

For the past two or three years I have given considerable attention to general infections by way of ear, nose and throat, and especially by way of the tonsillar ring. During the past two years, including my work in the San Diego County free medical dispensary, the San Diego City and County Hospital and the Children's Hospital, of the 700 tonsillectomies I have done and of the comparatively large number of nasal accessory sinuses I have operated upon, the most of the tonsillectomies and a large percent of the sinus operations were done for focal infection. I do not know the percent, but among the constitutional conditions the majority of the patients suffering from malaise and a varying degree of anemia. Hunter has found that chronic septic oral conditions frequently precede even pernicious anemia and that a septic mouth is among the causes.

The most common constitutional symptom of focal infection that I have noticed, and concerning which very little mention is made, is indisposition or malaise, often to the extent of great fatigue, due presumably to the chemical toxins produced by pyogenic bacteria. Every oto-laryngologist of any considerable experience has frequently observed cases of this kind. It is my opinion that a large percentage of patients applying to their physicians for relief from malaise, or even great fatigue, have one or more foci of infection somewhere in the body. The fact that such patients experience complete relief from the removal of the foci of infection affords the evidence of proof. No doubt in many a case the individual who has suffered for weeks or months from this symptom of focal infection, and who has during this period been working continuously, may naturally, though falsely, presume that whatever the degree of fatigue, it is due to overwork. Depletion of physical or mental vitality caused by toxemia from oral sepsis, predisposes to disease by lowering one's resistance, and oral sepsis lessens one's efficiency as well as furnishes the cause of a certain long list of constitutional diseases. The following case of a young lady who had given up her profession because of being physically incapacitated especially emphasizes this symptom:

Miss B., aged 25, stenographer, referred to me because of symptoms of focal infection. For about seven years she had rheumatism in different parts of the body, not being free from pain in all that time. For three months she had severe pain at the base of brain and a feeling of a constricting band around the head, soreness of the cords of the neck radiating down the shoulders, very severe pain in right side. A tonsillotomy had been done but without improvement. She had undergone operation for appendicitis and the appendix found normal. At the time of examination she was complaining especially of malaise, was anemic, had pain at base of brain, sense of constricting band about head, soreness of cords of neck radiating down shoulders, severe pain in right side, and for years a large number of canker sores in mouth. For about six months prior to the tonsillectomy done by me she had afternoon temperature ranging from 99° to 100°. Her tonsils were found to be cryptic and harboring infection, and on the 18th of last May they were enucleated. Two months later Miss B. reported relief from all the symptoms from which she was suffering at the time of operation and a gain of thirteen pounds in weight.

It was largely through the painstaking work of Rosenow that the association of the offending focus with the resulting constitutional conditions was demonstrated, as well as the identification of the bacteria involved. As a result of his work in this line Rosenow believes that arthritis, neuritis, neuralgia, migraine, gastric and duodenal ulcers, cholecystitis, appendicitis, and even such obscure diseases as Hodgkins' disease, the leukemias and pernicious anemia may be due to oral sepsis. Some twelve or thirteen years ago Rosenow, with Billings cooperating, began animal experimentation to prove the relation between foci and infections.

According to Rosenow streptococci vary in virulence in terms of their exposure to oxygen, and one strain of streptococci may be converted into another of higher or lower virulence. When inhabiting a susceptible host virulence increases. Under certain conditions a streptococcus may become a typical encapsulated pneumococcus. Certain strains possess an affinity for certain tissues, the streptococcus viridans for joints, tendons, aponeuroses, muscles and the endo-, peri-, or myocardium. Pus draining from pyorrheal pockets, tonsils, sinuses, etc., is far less virulent than pus under retention, due not only to the fact that there is less absorption, but that the microorganisms are more or less exposed to oxygen. Often in a tonsillotomy where even a small portion of the tonsil is left, the crypts in this portion are sealed and the streptococci contained in the sealed crypt or crypts are more virullent and more harm results, due to the fact that oxygen is prevented from coming in contact with the germ, as well as the resulting interference with drainage. There is no physiologic reason why a portion of a diseased tonsil should be allowed to remain yet there are surgeons who contend that they do not believe in tonsillectomy. Let us hope that in no case a surgeon shall advise tonsillotomy for the reason that it requires less perfect technic and less training and experience. To do a creditable tonsillectomy and get the results to which the patient is entitled the surgeon must have had special training and experience. A good general surgeon may have a very imperfect technic in the surgery of the specialties.

Before leaving the consideration of tonsillotomy in contradistinction to tonsillectomy I shall cite another concrete example—a case in which a tonsillotomy was done eight years previously by a surgeon who does not believe in tonsillectomy:

Edmund D., aged 16, referred to my clinic because of symptoms of focal infection presumed to be caused from diseased tonsils. This boy was found to have considerable malaise, irritability, anemia, etc., as well as to give a history of frequent sore throat and a marked susceptibility to head colds. There was about two-thirds of each tonsil still remaining, and through the plica supratonsillaris above the left tonsil there was an opening about the diameter of a slate pencil. This fistulous tract extended downward and backward. During the enucleation of this tonsil fully half a teaspoonful of pus escaped into the throat. In a few weeks this boy reported relief from the above symptoms. If a tonsil is diseased, remove it all.

In those cases of diseased tonsils in which it may be desirable to provide for treatment by autogenous vaccines, I recommend that cultures be taken from the contents of the tonsil crypts immediately following the tonsillectomy. Special effort should be made to get the culture from the depths of the crypts. It has been found that most of the organisms are located in the deeper parts of the crypts.

The present attitude of the medical profession relative to focal infections as a cause of so-called rheumatism, now known as polyarthritis, and allied conditions, seems to be somewhat like this: In every case the cause should be looked for and will usually be found in some focus of infection somewhere in the body. It may be in the mouth, the accessory sinuses, the middle ear or mastoid, the respiratory tract, the digestive tracts, or the urinary tract, and in old people there may be a focus of infection due to chronic purulent tracheo-bronchitis. But the faucial tonsils because of their gross and their histological anatomy are especially adapted to become reservoirs of infection. According to Deland the teeth are the most frequent sites of focal infection, the tonsils second in order, accessory sinuses third, while Beck believes that foci of infection are more frequently found in the faucial tonsils than in all the other organs combined. A septic tonsil may be normal in size, or may be even markedly atrophied and show no sign of being diseased, yet prove at time of enucleation to be the site of an abscess; and a very slight tonsillitis is sometimes followed by nephritis, arthritis, endocarditis, myocarditis, appendicitis, etc., and not infrequently inflammatory processes of the eye result from focal infection especially of accessory sinuses and tonsils. In a communication by Dr. DeSchweinitz relative to the treatment of iridocyclitis and uveitis special emphasis was given to the value of making thorough search for focal infection. At the last meeting of the Pacific Coast Oto-Ophthalmological Society, Dr. Veasey read a very interesting paper on chronic infection of the tonsils as a causative factor in the production of paralysis of the accommodation, and reported cases in which complete relief from impaired accommodation resulted from enucleation of the tonsils. Skin eruption and pruritis sometimes occur from oral sepsis. I have had a few cases of rash and itching of the skin that cleared up after the removal of septic tonsils.

To facilitate my investigation of a new case in which there is any suspicion of focal infection I have on my history card by way of suggestion the following outline:

Teeth?
Eyes?
Malaise?
Disposition?
Myositis?
Myocarditis?
Gastric or Duodenal Ulcer?
Arthritis?
Neuritis?
Cervical Adenitis?
Migrain?
Nephritis?
Cystitis?
Cholecystitis?
Constipation?
Anemia?
Neuralgia?
Endocarditis?
Thyroiditis?
Appendicitis?
Nausea?
Bad breath?
Cheesy beads?
Recurrent tonsillitis?

My first personal experience with tonsillitis being followed by acute nephritis was in Denver (1908) in the case of

Philip G., a boy of seven years. This boy was the son of over-anxious parents and I was called to see him for a very slight tonsillitis. The symptoms scarcely seemed to justify my medication, but a grain of calomel followed by a cathartic, aspirin and an alkaline gargle were prescribed, and the parents were assured that in a day or so their son would be all right again. However, a few days later the parents became alarmed and I was asked to call. This time I found the little fellow quite free from throat symptoms but presenting a pronounced septic appearance. A sample of urine was found loaded with albumen. A desperate but not fatal case of acute nephritis developed and the combined efforts of two physicians and two trained nurses were given for several days to save the boy's life. He had convulsion after convulsion and for two days and two nights his life seemed to hang by a thread. After his recovery his tonsils were removed.

Only recently I had another severe case of acute nephritis following a slight tonsillitis.

Not long since Mrs. R. was referred with the history of having neuritis of nerves of neck and arm and enlarged painful joints of feet, and with a history of obstinate constipation of several years' standing. Upon examination the faucial tonsils were found to harbor foci of infection, and this despite the fact the patient said she did not remember ever having tonsillitis except one recent slight attack. In addition to the symptoms given above Mrs. R. complained of general indisposition and queer little rheumatic pains quite generally over the body. In less than a month after the enucleation of the tonsils all of the above symptoms passed away and the patient, who had lost considerably in weight, gained over ten pounds. She especially emphasized the fact that she had been completely relieved from the obstinate constipation within a week's time.

While this case emphasizes the potential relief from poly-arthritis by tonsil enucleation, it also records relief from a symptom to which I have seen no reference made, namely, obstinate constipation. Shortly after this tonsillectomy I enucleated the tonsils of one of the local school teachers, Miss C., referred by Dr. Allen. Within a few weeks following the operation Miss C. reported, among other improved conditions, relief from obstinate constipation which had been of several years' standing. These together with subsequent cases make it appear that some relation exists between infected tonsils and constipation. At first I was disposed to look upon this as coincident but am convinced from the frequency of relief from this symptom, it must be more than coincident. Possibly the relief obtained is due to the removal from the system of chemical toxins which emenate from bacteria harbored in foci of infection.

It has been found that sometimes the tonsillar infection becomes latent and produces months later very serious trouble at points far away from the original site. The patient makes a recovery from the acute tonsillitis, but there is often latent foci of infection remaining deep in the crypts of the tonsil and the evidence of infection may not occur for months or even years after the acute sore throat. Given, then, a case with symptoms of systemic infection, it is up to the physician to inquire into the history of sore throat at any time previous. It is not necessary that the patient complain of recurrent attacks of tonsillitis or any degree of throat soreness, and it should also be remembered that objective evidences of acute as well as chronic tonsillitis present not infrequently, when the patient gives no previous history or does not at the time complain of sore throat. Even in cases with no previous history of tonsillitis abscesses are at times found in the tonsil at operation. About six months ago a little girl of nine years was brought to me by her father for careful examination of nose and throat, the father saying the child had always been "puny" and unlike other children—did not play much, was easily fatigued, but gave no history of tonsillities. A careful examination revealed only a slight involvement of the naso-pharyngeal tonsil, and as far as I could determine there was no objective involvement of the lingual or faucial tonsils; but the history, the appearance of the child, the presence of chronic cervical adenitis, suggested focal infection and by the process of exclusion the focus was presumed to be in the faucial and naso-pharyngeal tonsils and tonsillectomy and adenectomy advised. During the enucleation an abscess in one tonsil broke and a small amount of bad-smelling liquid pus escaped into the throat. This was swabbed out as quickly and as thoroughly as possible but the child was very ill for a week or more following the operation. For several days she had high fever, rapid pulse, and presented a picture of marked sepsis. Now the little girl is well and strong, plays like other children, and has gained very materially in weight.

It has been my observation that in a very large per cent. of infected tonsils there is associated cervical adenitis. Gardiner claims that in about 80 per cent. of chronic cervical adenitis in which no obvious source of infection is present the tonsils are infected.

The following case records improvement in a thyroiditis from tonsil enucleation:

Miss P., trained nurse, referred by Drs. Coburn, Owen and Fly. She had had tonsillitis and quinsy at times most of her life. She complained of malaise, soreness in muscles, was anemic, had arthritis from time to time, there was a dull aching in the thyroid gland, tendency to syncope and heart palpitation when tired. Upon examination the tonsils were found to be cryptic, small, submerged and harboring foci of infection. There was a thyroiditis. The neck measurement over the thyroid was 15½ inches. The tonsils were enucleated nearly two years ago and favorable results were reported after a few weeks following the operation. At the present time the patient reports freedom from all symptoms given at time of operation, and the neck measurement has decreased 1½ inches.

The next case I wish to report illustrates the effect of tonsillar focal infection upon the digestive tract:

Mrs. M., aged 36, housewife, about a year ago, after being treated by several physicians for as many ailments, was convinced, of her own volition, that the cause of a very stubborn continuous indigestion, covering a period of several years, associated with pronounced nausea and offensive breath, was due to diseased tonsils. She was at this time anemic and very much emaciated. Her tonsils were found to be submerged, cryptic, with the crypts unusually full of offensive cheesy pus. A tonsillectomy was done the second day of September of last year. Within a few weeks following the enucleation her nausea disappeared, her digestion became quite normal and her breath was no longer offensive. Her improvement in general health was quite rapid. Only a few days ago she reported a gain of 30 pounds in weight. Her color is good and she says she is perfectly well.

Patients complaining of offensive breath or bad taste in the mouth should always lead one to investigate the tonsils and accessory sinuses relative to their harboring infection.

Tonsillar investigation is done by carefully inspecting the tonsils with the tongue well depressed. If there is infectious material present in the crypts of the tonsil or between the pharyngeal pillar and tonsil, it will often cause an inflammed or congested appearance of the tonsil, the plica tonsillaris, as well as the anterior and the posterior pillars, thus indicating inflammatory reaction, and there is sometimes slight edema. With the tongue well depressed, pressure against the anterior pillars with the end of a tongue plate, liquid pus or cheesy infectious beads of foul smelling products of decomposition will be expressed from the tonsil crypts. These cheesy masses are composed of food particles, saliva and bacteria.

Diseases of the nasal accessory sinuses are more prevalent than is supposed by the average physician. The symptoms given by the patient are seldom well defined and cannot always be depended upon, however they should be carefully taken and duly considered. But the objective symptoms are reliable, and if sufficient time is taken and careful observation made, one of experience need not with the present aids, often fail to make a correct diagnosis. No one is unfamiliar with the methods of examination now employed, viz.: application of adrenelin, use of negative pressure, transillumination, and *x*-ray in locating involvement of the nasal accessory sinuses. The intranasal relations and the intranasal balance should be as nearly normal as possible, in order that there be proper ventilation of the nose and no impairment of drainage of the sinuses.

Perhaps at this time it should be said that nasal congestion even to the extent of nasal stenosis, is not infrequently due to diseased tonsils and adenoids. This is probably due in part to non-use of nose, but in no small measure to the chemical toxins emanating from diseased tonsils and adenoids. A badly deflected nasal septum produces nasal imbalance which may be unilateral or bilateral. As a result of this imbalance there is lack of vaso-motor control and more or less continuous vaso-motor dilation of the nasal erectile tissue, therefore increased nutrition, resulting in growth. If the growth or congestion is sufficient to cause approximation of two surfaces of mucous membrane there will be in addition to nasal reflexes, an accumulation at that point of nasal secretion and bacteria, and this in itself, due in part to lowered vitality and sometimes break in continuity, become a source of infection.

The following is one of many concrete examples of the impairment of ventilation and drainage resulting in infection of the nasal accessory sinuses. In this case there was an excessive bilateral maxillary sinus empyema, due no doubt primarily to hyperthrophic rhinitis, the stenosis being subsequently increased by the development of polypi.

Mrs. H., referred by Dr. Dotson, complained of arthritis in shoulder and knee, severe frontal headache and aching over cheek bones and under eyes, excessive pus discharge from both nostrils, mouth breathing. Symptoms of focal infection were malaise and arthritis of shoulder and knee. She was found to have hypertrophied turbinate bodies, nasal polypi and empyema of both antra. Both antra were operated upon with the result of practically cessation of pus discharge and complete relief of the arthritis together with great amelioration of the other symptoms.

Among the number of similar cases that I have seen is the following:

Eugene M., aged 15, for several years had frequent attacks of sore throat with high fever, nausea and vomiting, swelling and soreness of glands in neck and groin. These attacks were always associated with great prostration. Between attacks he complained of being "tired," no appetite, was irritable and had pain in side on slight exertion; was undeveloped. Examination revealed large, fibrous, cryptic tonsils. By pressure, beads of cheesy pus were expressed from the tonsil crypts; adenoids were also present. The tonsils were enucleated and the adenoids removed on the first day of February of this year, and whereas the sick spells referred to had formerly occurred every month or two there has been no attack of sickness of any kind in the eight months since the operation. The patient has gained materially in height and weight and shows marked improvement in many ways.

No doubt many of the attacks in childhood of slight fever, indisiposition, lack of appetite, headache, etc., attributed to the stomach, are really due to a mild infection by way of the tonsils.

A history of frequent colds in the head should cause one to investigate the condition of nose and throat, and especially Waldeyer's ring, perhaps better called the tonsillar ring, consisting of naso-pharyngeal tonsil, lingual tonsil, as well as the faucial tonsils. Situated immediately below the faucial tonsil there is not infrequently follicular, lymphatic tissue which is capable of harboring infection. Dr. Matthews of Rochester called the attention of the profession to this offending area. Among the cases I have observed there were several of septic follicular lymphoid tissue immediately below the faucial tonsils. When such tissue presents it is best that it be carefully and thoroughly removed.

In the case of Miss S., referred by Dr. Donnell, there was an especially excessive amount of follicular lymphoid tissue in this position. With Miss S. the focus of infection as well as the cause of a very distressing cough was diagnosed as being in large measure due to sepsis and hypertrophy of this tissue. Because of the cough in question, previous to coming to Dr. Donnell, the young lady had been treated for pulmonary tuberculosis. Following the enucleation of the faucial tonsils and a careful dissection of the follicular tissue below the tonsils, the symptoms of focal infection and the cough disappeared.

Not infrequently susceptibility to grippe results from diseased tonsils. As evidence of proof one need only refer to his case histories and note the relief obtained in this particular following the removal of diseased tonsils.

The literature records but few instances of cystitis resulting from tonsillar infection, but there appears to be some selective action between tonsillar infection and cystitis. Among my cases there were a few suffering from chronic focal infection of the tonsils associated with cystitis who reported relief from the cystitis following the tonsillectomy.

When a patient complains of earache, especially a child, among other things think of adenoids as well as teeth and tonsils. The location of the naso-pharyngeal-tonsil makes it especially likely to infection via nose as well as mouth. Infection of this tissue has been found to cause a loss of the ciliated epithelium and replacement by squamous epithelium, thus rendering it more susceptible to subsequent infection. It should also be remembered that adenoids have been found in the early months of infancy and cases have been reported where hypertrophy of the naso-pharyngeal tonsil existed at time of birth. The naso-pharyngeal tonsil may become infected via nose from purulent rhinitis, sinusitis, inspired air laden with pyogenic bacteria, etc. Via mouth the naso-pharyngeal tonsil may be infected from septic faucial tonsils, septic teeth, etc. It should be remembered that the mouth is a hotbed of bacteria and at all times there are in the mouth pathogenic germs capable of doing great physical harm to their host even at points far away from the mouth if they can somehow gain entrance to the blood stream. The portal of infection in the faucial tonsil is the crypt, in the naso-pharyngeal and lingual tonsil the sulcus and in the lymphatic tissue found below the faucial tonsil, the follicle. Very frequently foci of infection are harbored in the folds of the naso-pharyngeal tonsil and there is an extension to the middle ear and mastoid. Shambaugh believes that even some of the labyrinthine cases of obscure origin may be caused by focal infection, usually from the tonsils or teeth.

Dr. T., a California aurist, whom I met recently, told me of his own personal experience with a serious labyrinthine involvement with perfectly normal middle ears. It was found after careful investigation that abscesses at the roots of certain teeth were the cause of the irritation, and after the extraction of the diseased teeth the labyrinth symptoms completely subsided. It is my habit in cases of labyrinthine involvement of obscure origin to investigate the tonsillar ring and accessory sinuses, as well as to refer to a dentist for radiograms.

The following case is reported for the reason that I found but one case in the literature in which there was mention made of relief from rheumatoid arthritis through a radical mastoid operation.

Miss P., aged 15, referred by Dr. Allen, had measles at four years of age followed by discharge from left ear; discharge continued for a period of eleven years. At the time of examination the patient, in addition to the ear symptoms, was anemic, complained of malaise and very severe pains from arthritis of elbows as well as severe pain in head. A radical mastoid was performed in February of this year. The arthritis in elbows quickly subsided, the headache ceased and the anemia and malaise have disappeared.

The following case shows symptoms of focal infection proven to be due to a focus in the middle ear and mastoid.

Miss M., aged 20, referred by Dr. Parks, had history of frequent sore throat, was a mouth breather, had some rheumatism, headache. Scarlet fever when a child left her with a discharging right ear. On examination the faucial tonsils were found to be cryptic, containing infectious beads of cheesy pus, and there were also adenoids. On March 25th, 1915, the tonsils were enucleated and the adenoids removed, with resulting relief from mouth breathing and sore throat. It was hoped that the removal of the diseased tissue of throat and nasopharynx might clear up the ear discharge, as it often does, but in her case, this, together with thorough treatment of the middle ear for a period of several weeks, failed to show any great improvement in the chronic purulent otitis media. In January of this year she was anemic, suffered from great malaise, was extremely irritable, nervous, had severe pain at base of brain, and, as she put it, "Could not think straight." She was losing in weight and had excessive discharge from the middle ear. A radical mastoid operation was done on the 22d of January of this year with the result that the young lady is relieved from the anemia, the malaise, polyarthritis, the pain at base of brain, has gained several pounds in weight, says she has a great deal of vital force and a clear mind.

Swelling and inflammation of the cervical, sublingual and submaxillary glands suggest infection by way of the mouth, and one should always investigate the faucial and lingual tonsils as well as the teeth.

Vincent's angina, which must be differentiated from chancre of the tonsils, diphtheria, etc., and which often causes suppuration of the cervical glands involved, as well as the systemic complications of nephritis, painful joints, etc., frequently enters the system via the faucial tonsils.

In Ludwig's angina with its systemic complications and high mortality, the tonsil is not infrequently the portal of infection, although it often gains entrance into the sublingual and submaxillary glands via floor of mouth, ulcerated teeth, etc. In a patient that I saw in consultation with Dr. Loos a few months ago a fatal case of Ludwig's angina began as a slight tonsillitis.

It has been found that mixtures of staphylococci, forms of streptococci, coli communis bacilli and tubercle bacilli are frequently concerned in chronic focal infection. But it should be remembered that there may be several different foci of infection with as many different strains of bacteria. In other words, finding a focus of infection in a given organ is not proof positive that one or more other foci may not exist even in parts quite remote from the one found. Hence the necessity of cooperation of dentist, internist, general surgeon, specialist, etc. Where there are several foci of infection found, it is only reasonable to presume that the removal of each one aids nature in direct proportion to the severity of the one removed in her efforts to overcome the effect of those still remaining.

The following comparative failure on my part affords a concrete example of what I have in mind.

Mr. R. was referred for examination of the nose and throat. Among his symptoms were soreness in neck muscles as well as pain and stiffness in upper dorsal spine. His tonsils were found to be small but cryptic and containing cheesy pus. Enucleation of the tonsils resulted in improvement in some ways but the myositis and spinal arthritis did not appear to be helped in any particular. Several months later one of our local dentists extracted a sensitive tooth and found a root abscess. In a short time following the extraction of this tooth the arthritis disappeared and the pain in muscles of neck was relieved. My memory of this case is an ever-present reminder that the teeth should be investigated as well as the nose, throat and other portions of the body which are capable of harboring foci of infection.

In conclusion: The effects of foci of infection vary in terms of the virulence of the microorganism, the length of time that the focus has existed, whether there be a large or small number of organisms, as well as the amount of chemical toxins gaining entrance to the lympth and blood streams, whether the absorption be fast or slow, the degree of impairment to the integrity of the involved tis-

sues and the relative immunity or susceptibility of the individual.

I believe that the subject of focal infection is of sufficient importance that in the interests of humanity every physician should thoroughly qualify that he may best serve those who apply to him for relief from the resulting symptoms.

BIBLIOGRAPHY.

Fischer: The relation of mouth infection to systemic disease. Dental Summary, 1915, Sept., p. 716.

Hartzell: The dental path: its importance as an avenue of infection. Surg. Genecology and Obstetrics, Jan., 1916, p. 18.

Fischer, Louis: Chronic tonsillitis. N. Y. Med. J., Jan. 22, 1916, p. 147.

King: The Connellan-King diplocci in infections of throat with a special reference to rheumatism. Med. Rec., Dec. 4, 1915, p. 958.

Anderson: Appendicitis as a sequela of tonsillitis. Am. J. of Med. Sci., Oct., 1915, p. 541.

Schurley: Relation of tonsil to thyroid disease. Ann. of Otol., Rhin. and Laryngol., Sept., 1914, p. 672.

Shambaugh: The faucial tonsil as a focus for systemic infection. Ibid, Sept., 1913, p. 659.

Borden: Systemic infection of middle ear origin in the exanthemata. Ibid, March, 1915, p. 1.

Hopkins: A case of septic infection of the parotid glands resulting fatally. Ibid, Dec., 1914, p. 871.

Gilmer: Chronic oral infections. Archiv. of Int. Med., April, 1912, p. 499.

Haskin: Responsibility of the physician in oral infections. Laryngol., April, 1915, p. 231.

Jones: Etiologic relationship of focal infections to systemic disease. Pac. Dent. Gaz., June, 1915, p. 387.

Endelman and McCoy: Studies in mouth pathology from the standpoint of toxic absorption and its sequela. Ibid., Sept., 1915, p. 545.

Putterbaugh: Infections of the mouth and their relation to systemic disease. Ibid, Oct., 1915, p. 671.

Oftedal: Some clinical manifestions of focal infections. Jour. of A. M. A., Nov. 27, 1915, p. 1911.

Freundlich: The teeth as a primary factor in diseases of the ear, nose and throat—the diagnostic value of cooperation of the otologist, rhinologist and laryngologist with the dentist. Laryngol., Jan., 1915.

Young and Newton: Tonsillectomy as a therapeutic measure in the treatment of chorea and endocarditis. Bos. Med. and Surg. Jour., Sept. 2, 1915.

Price: The prevention of systemic diseases arising from mouth infections. Cleve. Med. J., Oct., 1915, p. 657.

Butt: Infection of nasal cavity from diseased toothroot. J. of A. M. A., Aug., 1914, p. 549.

Beck: Chronic focal infection of the nose, throat, mouth and ear. Ibid, p. 1636.

Wilson: The faucial tonsils as a gateway to general infections. Ibid, p. 1638.

Rosenow: Mouth infection as a source of systemic disease. Ibid, p. 2027.

Rhein: Mouth infections: their etiology and a consideration of what effect they may have on the vital organs and their tissues. Ibid, Feb. 15, 1913, p. 503.

Wood: Tonsillar infection. Am. J. of the Med. Sci., March, 1914, p. 380.

Streitman: Endocarditis with steeptococcemia. Calif. St. J. of Med., vol. 13, No. 3, p. 106.

Blue: Focal infection. Jl. of Tenn. St. Med. Assn., vol. 8, No. 2, p 87.

Rosenow: Relation of and lesions produced by various forms of streptococci with special reference to arthritis. Jl. of the A. M. A., Nov., 29, 1913, p. 2007.

Price: The prevention of systemic diseases arising from mouth infections. Cleve. Med. Jl., Oct., 1915, p. 657.

Blum: The proper position of tonsillectomy in pediatrics. Arch. of Ped., Nov., 1915, p. 817.

Billings: Focal infection. Jl. of the A. M. A., Sept. 12, 1915, p. 899.

Rosenow: Etiology of arthritis deformans. Ibid, April, 1914, p. 1146.

Gilmer: Oral infection in relation to systemic disorders. Pac. Dent. Gaz., Nov., 1915, p. 718.

Shambaugh: Focal infection in the etiology of labyrinth disease. Ann. Otol., Rhinol. and Laryngol., Sept., 1915, p. 479.

Cecil: Streptococcus viridans in its relation to infections of the upper respiratory tract. Laryngology, Feb., 1915, p. 97.

Rhein: Deep seated alveolar infections. S. G. O., Jan., 1916, p. 33.

De Schweinitz: Focal infections in their relation to certain disorders of uveal tract. Ophthalmic Record, Dec., 1915.

Carmody: Discussion of papers by Drs. Beck and Wilson. Jl. of the A. M. A., Nov. 7, 1914, p. 1641.

Levy: Discussion of papers by Drs. Beck and Wilson. Ibid, p. 1640.

VERTIGO: ITS CAUSES AND METHODS OF DIAGNOSIS.

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The subject of vertigo is as old as the healing art itself and medical literature abounds with essays on the subject. When vertigo was seen to accompany certain diseases, it was spoken of as vertigo belonging to that affection. Thus when it appeared in the course of nephritis, it was renal vertigo; if in association with an affection of the liver, it was hepatic vertigo, and so on. As a result there were almost as many kinds of vertigo as there are diseases; but when the vertigo appeared independently and not in the course of some disease, it was termed idiopathic or essential vertigo. That vertigo was essentially a disturbance of equilibration was gleaned long ago, but so long as the equilibratory function itself was not clearly understood, vertigo remained in the land of mystery.

For many centuries the individual was regarded as possessing only five special senses; that is, sight, hearing, taste, smell, and touch. A great advance was made when the sixth sense—the so-called "muscle-joint-and-splanchnic sense" came to be recognized. Recent studies of the internal ear, however, show that there is still another, seventh, special sense, the so-called "static sense". This static sense is a special sense a truly as any of the other and corresponds to them in its general anatomic and physiologic requirements. Similarly to them, it has an "end-organ" for receiving stimuli, a conducting nerve for conveying sensations, and definite nerve tracts leading to brain centers where the stimuli are interpreted and translated into equilibration.

A host of investigators have conducted experiments showing the effect on equilibration when the internal ear is either partly or completely destroyed. As a result of these, it is now universally recognized that the static portion of the internal ear is the chief organ of equilibration—in other words, it is the "end-organ" of this seventh "static sense". To be sure, the ear is not the only organ concerned with the equilibratory function. The equilibrium of the body is maintained because of an harmonious co-operation of *three* senses—sight, muscle, and static sense. Of the three, however, the end-organ of the static sense is of peculiar interest because its *only* function is the maintenance of balance, whereas with respect to the other two, equilibration is simply a collateral function.

Summing up, then, we must have in mind the following:

1. Equilibrium of the body is maintained chiefly by the ear and its associated pathways and centers known as the vestibular apparatus, aided by the sense of sight and muscle sense.
2. Vertigo is a sensation perceived within the brain when perfect equilibration is interfered with.

From the foregoing it is evident that in considering the causes of vertigo we must look for disturbances that will affect the chief organ of equilibration, namely, the vestibular apparatus. From a medical standpoint, therefore, the most important aspect of the study of the static portion of the internal ear and its innervation is the subject of vertigo. The clinician is often confronted with cases of dizziness that tax his ingenuity to the utmost, and it is surely not overstating the fact to say that until recently he was able at best only to guess as to its significance. The realization that the ear is the chief organ of balance has thrown a new light on its importance. Previous to the conception of the ear as an equilibratory organ, the general practitioner regarded this organ somewhat as follows: if the patient be deaf, a specialist should see what he can do to improve the hearing, and if there be any inflammation of the ear, it should receive local attention. But far more important and yet scarcely recognized is the part that the static portion of the ear plays in the well-being of the entire body. The aurist knows of the recent advances in the study of the ear, and it may not be amiss to emphasize their importance to the general practitioner as well, because of

1. The necessity of recognizing certain internal ear conditions and appreciating their remote relations.
2. The far-reaching significance of the ear as the sense organ of equilibration.
3. The value of the newer ear tests in determining the cause of vertigo, no matter what its type or origin. It is with such cases that the physician comes in daily contact.

The general practitioner is familiar with conditions of the external ear, the middle ear, and the cochlear portion of the internal ear. In the external ear he encounters impacted cerumen, foreign bodies, eczema, furunculosis, etc. In the middle ear he has to deal with various types of deafness and with inflammatory conditions. Affections of the cochlea manifest themselves by impaired hearing and noises in the head. In the presence of such conditions, the attention of the physician is immediately called to the ear, in fact the patient himself recognizes that he has an ear condition. All these are of interest from a local standpoint only, but the static portion of the ear, on the contrary, is part and parcel and servant of the whole organism. A big, strong, healthy man may be unable to stand up or even sit up in bed because of a silent congestion of the internal ear. Perhaps the lesion is no larger in extent than the head of a pin and yet the patient may be entirely incapacitated. Just as affections of the cochlea are manifested by impaired hearing and tinnitus, so the disturbance of the static portion of the internal ear may cause dizziness, staggering, nausea, vomiting, and diarrhea; but whereas tinnitus and deafness at once point to the ear, we venture to say that when confronted with dizziness and nausea, the general practitioner may not suspect the ear as the source of the trouble. The cases of vertigo from ear conditions, with nausea, vomiting, and retching, that are treated with "stomach powders" are exceedingly numerous, and it cannot be too strongly emphasized that vertigo from whatever cause can result only from an affection of the vestibular apparatus directly, so that under such circumstances the condition of the ear and its associated pathways should be thoroughly investigated.

Vertigo may be of two kinds:

1. Experimental or induced vertigo.
2. Vertigo resulting from disease.

Experimental or induced vertigo results when the equilibratory end-organ is powerfully stimulated by artificial means. Normally every conceivable motion of the body—be it in a linear or rotary plane—causes a movement of the lymph in some portion of the static labyrinth, either in the saccule or the utricle, or in the semicircular canals, and this in turn stimulates the sensitive hair-cells of the end-organs there present. The impulses thus generated are carried along the vestibular nerve pathways to their respective centers. Inherited memory dating back for countless ages, as well as innumerable repetitions of this sort during the individual's lifetime result in a correct interpretation as to the meaning of all these stimuli, and the person learns to know that a certain stimulus or set of stimuli always mean a certain kind of motion. The individual has also learned that this sort of information is reliable and trustworthy, and in accordance with fact. He is, therefore, not in the least disturbed by them. Should the lymph in the labyrinth, however, be made to move violently by artificial means, such as can be brought about by turning an individual in a revolving chair or douching the ear with cold or hot water, he would then be getting information that is not true to fact. For example, after he is turned in a chair and suddenly stopped, the endolymph still continues circulating, conveying the information to the brain that he is moving, whereas as a matter of fact, he is not. Here, then, he has information which is not in accord with fact, and he therefore has vertigo. While he was being turned, the endolymph moved and conveyed to him the sensation of motion, but that produced no vertigo because it was in accordance with actual facts—his previous experience assuring him that he was actually moving. Cooling or heating a portion of the labyrinth by means of douching also produces motion of the lymph. Since, however, the individual is sitting quietly in the chair all this time, such information is not in accordance with fact and results in vertigo. This induced or experimental vertigo is of great service in the study of the integrity of the pathways responsible for this vertigo and can be made of great clinical value.

Vertigo resulting from disease is entirely different. It results whenever there is an interference with the perfect balance between the special static organs on each side. Both ears always act in unison and are constantly sending out an equal flow of impulses to the musculature of the body insuring perfect equilibration. When diseases destroys the apparatus on one side completely or partially, or produces an irritation—be it in the ear itself or along any pathway leading from it—there immediately results an inequality of tonic influence as between the two sides, with a resulting disturbance in equilibration, and vertigo. The important thing to remember is that is is always a disturbance of the ear and its associated pathways and nothing else that can result in vertigo. When disease in remote organs causes vertigo, it is only because of a definite influence on the ear mechanism.

Vertigo may be caused by

1. Lesions within the internal ear, such as labyrinthitis of the various types, or effusions or hemorrhage within the internal ear. Inflammatory conditions of the middle ear, for instance acute otitis media or mild inflammation of the inner ear itself, produce only irritative effects if any, so that the papatient suffers from more or less vertigo as long as the acute state of the congestion lasts; the vertigo vanishing with the disappearance of the inflammation. On the other hand, slow degenerative changes within the labyrinth or sudden destruction of the whole or a part of one labyrinth is accompanied by marked vertigo, nausea, and vomiting, and loss of equilibration. Sudden destruction of the whole or a part of the labyrinth may be produced, rarely by trauma, but usually by hemorrhage or serious effusion into the labyrinth and it may occur in the course of diabetes, Bright's disease, or of any condition in which the vascular system becomes affected. It is this class of cases that exhibits the so-called Meniere's symptom complex. The hearing in these cases usually is markedly affected, if not altogether lost, and the condition is characterized by repeated attacks with a suddenness of onset, the violence of the symptoms quickly reaching a climax and then gradually subsiding and all disappearing when the brain centers have acquired the function of compensation.

2. Toxemias affecting the ear or other portion of the vestibular apparatus, such as ptomain poisoning, constipation, alcoholism, poisoning by chemicals, as for example lead poisoning, nephritis, gout, rheumatism, syphilis, and the toxemia of infectious fevers such as scarlet fever, typhoid fever, and mumps.

3. Definite lesions along the pathways from the ear within the brain itself, such as tumor, hemorrhage, thrombus, infarct, abscess, gumma, tubercle, specific neuritis, multiple sclerosis, syringomyelia, polio-encephalitis, or meningitis.

If vertigo can be produced only by disease affecting the vestibular apparatus, then it follows that in order to determine the cause of vertigo, we must employ those tests that differentiate the function of this apparatus. Such an examination comprises a search for any spontaneous vestibular phenomena that may be present, as well as an analysis of the responses to ear stimulation. Of the two methods, the latter is by far the more important. We start out with a fixed and definite idea that a normal internal ear, intact nerve pathways leading to normal nerve centers, will *invariably* produce a rhythmic nystagmus and vertigo when a stimulus is applied.

The nystagmus lasts twenty-six seconds in a certain direction when the individual is turned in a chair ten times, and the vertigo also is of twenty-six seconds' duration. Because of the vertigo there also appear past-pointing and falling. If, on the other hand, stimulation of the internal ear fails to produce one or all of the responses, the evidence points positively to an impairment at some point of this apparatus. A knowledge of the anatomy of the vestibular mechanism is of course indispensable, and one's ability to make a correct diagnosis as to the location of any lesion causing vertigo depends entirely on his powers of visualizing the anatomical pathways that constitute this vestibular apparatus, as far as these are known. The static portion of the internal ear is the starting point for all nystagmic and vertigo impulses. Any stimulation applied to the internal ear, be it turning or douching, affects all nerve endings in like manner, and we think it highly improbable that there could be a lesion that would affect the hair cells concerned in the production of nystagmus without affecting also the hair cells concerned in the production of vertigo. If, therefore, stimulation of the internal ear fails to produce any response at all, or when *all* the responses are affected similarly, we conclude that the lesion is either in the labyrinth itself, or in the eighth nerve. If on the other hand, stimulation of the internal ear produces one good reaction at the same time that the other responses are absent or markedly impaired, it is obvious that the internal ear itself and the eighth nerve are intact, and that the lesion is located centrally; that is, after the eighth nerve has divided into its component portions on entering the brain-stem at the junction of the medulla oblongata and the pons. If stimulation produces poor nystagmus, the block is obviously in the vestibulo-ocular tracts; whereas, if it is the vertigo which is subnormal after stimulation, the block must be located along the vestibulo-cerebello-cerebral tracts—those concerned with the production of vertigo. A knowledge of the course that all these tracts pursue within the brain substance enables one to locate accurately the site of the lesion responsible for the vertigo. However, it not infrequently happens that patients complaining of vertigo when tested show normal reactions to ear stimulation. In these cases, it is obvious that we are dealing with a condition in which the vestibular apparatus is irritated at some point, and a search should be made for such a source of irritation. This may be a focus of infection in the tonsils, teeth, stomach, kidneys, etc.

Therefore, just as we examine the urine in nephritis or diabetes, or as we have a Wassermann test made in cases of suspected syphilis, just so the ear-tests enable us to analyze the apparatus responsible for dizziness. Instead of guessing, we then learn the reason for the vertigo. Based on an experience of hundreds of examinations of pathological cases in the department of Neuro-Otology at the University of Pennsylvania, we do not hesitate to say that it is very rare that a "dizzy" case remains obscure after these ear-tests, and in most instances the diagnosis becomes clear and simple. After these tests are made we are able to say for example that the patient is dizzy because of a toxic impairment of the labyrinth, a labyrinthitis, an organic lesion in some part of the vestibular tracts such as is produced for example by brain tumor, internal hydrocephalus, brain abscess, or multiple sclerosis; or in the presence of normal reactions we can state with assurance that the vertigo is purely functional or due to a transitory toxin.

In conclusion the following points may be emphasized:

1. There can be no vertigo unless there is a disturbance of the vestibular apparatus. When disease in remote organs is accompanied by vertigo it is because such a pathological state somehow or other affects the vestibular apparatus.
2. Vertigo may be due to simple irritation of the vestibular tracts. In such a case it is temporary and fleeting in character, leaving the apparatus itself intact, and the tests will therefore show normal responses.
3. Vertigo may be produced by a lesion of the internal ear itself.
4. Vertigo may be produced by a lesion situated within the brain along some pathway in association with the ear.
5. Disturbances of the vestibular apparatus, with vertigo, can be definitely diagnosed and differentiated by means of the ear-tests.

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Glossectomy and Laryngectomy.

Glossectomy and laryngectomy for carcinoma of the tongue and of the larynx are undertaken not merely to relieve suffering but also in the hope of effecting a cure. They are formidable operations, especially laryngectomy, and in a large percentage of cases they do not lengthen life but promptly terminate it. For this reason, and because it involves the loss of articulate speech, one is hardly justified in persuading any unwilling patient, young or old, to sacrifice his tongue or his larynx.

DEFLECTIONS OF THE NASAL SEPTUM.

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Although the etiology of deflections of the nasal septum has been the subject of constant study for many years, no hypothesis yet suggested appears to adequately explain the occurrence of the deformity in every instance. Nearly as many etiologic theories have been advanced as there are writers on the subject, some fanciful and others more or less reasonable, but as nothing would be added to existing knowledge by a complete review, only a few of the most probable causative factors will be considered in detail.

(1) Externally inflicted trauma: Experience and observation have shown that traumatism is the most frequent cause of deviation, at least so far as the cartilaginous septum is concerned; but fracture of the vomer or perpendicular ethmoid plate from a blow upon the nose seems improbable without accompanying destructive injury to surrounding tissues. The most careful anamnestic and clinical investigation may sometimes be required to establish the history of remote or even recent traumatism, the local manifestations of which may have been so trivial as to attract scant attention; yet sufficient injury may have been produced to incite later septal deviation. In fracture or dislocation of the quadrilateral cartilage, obstruction of one naris usually occurs from the convexity, the free cartilaginous border partially occluding the other; compensatory hypertrophy of the inferior turbinate will be found present in the majority of instances.

(2) Increased cranial development with consequent enlargement of the facial angle: Many observers attribute septal deflections to increased development of the osseous cranial and facial structures with consequent change in anatomic conformation. While this merely states an observed clinical fact without presentation of evidence concerning the underlying cause which produces the increased development, it seems reasonable that irregularity in size and conformation of the cranial and facial bones may result in sufficient disturbance of the nasal tissues to cause faulty position with deflection of the septum. It is well known that inordinate upward growth of the vomer is a not infrequent causative factor; the ethmoidal plate is less often responsible for the deformity.

(3) The anatomic situation and excessive development of the septum nasi: It must be remembered that anatomically the normal nasal septum occupies practically a fixed position between the unyielding frontal, ethmoid and sphenoid bones; consequently if for any reason the septum assumes greater than normal rapidity of development, thus "outgrowing" the limits of its surroundings, a deviation or "bending" is the logical and necessary outcome. A similar result may also be produced by anomalous growth of adjacent osseous structures. The reason for such developmental errors, however, is not well understood. It has been suggested that even here "trauma may be the starting point of hypernutrition with consequent deviation."

(4) Persistent high-arched palate: It has been claimed that in the majority of instances persistent high-arched palate is responsible for the production of septal deviation, the causative factor of the original deformity being rickets. The fact that in certain cases rickets and septal deflection co-exist is suggestive of such an interrelation, but positive proof is lacking. The association of high-arched palate, septal deformity and nasopharyngeal pathology is more constant, and the evidence of causal relationship consequently more convincing.

(5) Excessive turbinal development, presence of nasal neoplasms, spurs, ridges etc.: It is readily appreciable that unusual growth of the turbinal structures, the presence of enchondroses, exostoses, mucosal excrescences, neoplastic formations, etc., may induce varying degrees of septal deformity. While spurs, ridges, etc., are oftentimes found associated with deviation, there is no necessary relationship between them, as one may be present without the other. As in most other types of deviation, the cartilaginous septum is usually involved.

Strange as the observation may appear, non-traumatic septal deviation seems to be largely a product of ultra-civilization; it is unknown among animals and savages, and rare in all semi-civilized races. "The more civilized the race, the more frequently is septal deviation noted."

Numerous presumed contributing and predisposing causes have been mentioned by various authors, e. g., rickets, syphilis, tuberculosis, cretinism; neuroses, the "stigmata of degeneracy," etc., but the etiological relationship between these clinico-pathological disorders and septal deviation does not appear to have been definitely established. It is difficult of understanding why deflection of the septum nasi should occur in one individual suffering from syphilis, tuberculosis, etc., whereas a thousand others under apparently identical circumstances enjoy freedom from such deformity; and this statement is equally applicable to the majority of the other supposed predisposing causative factors. It is believed that mouth-breathing, which is prominently mentioned by textbook and other authors as a cause, usually represents one of the logical results of nasal or nasopharyngeal obstruction and has practically nothing to do with production of the deformity.

Septal deviations may assume a multitude of types, and for that reason no accurate classification can be made. Ballenger divides them into (a) cartilaginous, and (b) osseous, and gives numerous so-called varieties of each; Kyle speaks of two classes, i. e., those with and those without external deformity, also mentions characteristic "S" and "C" types; Thompson refers to cup-like deviations, saddle-shape, and several other types. "It is obvious, therefore, that while classification into groups is perhaps helpful for the purpose of study, it is useless and deceptive in practice, for there are so many irregularities and anatomical peculiarities that it would be difficult, even impossible, to form a classification which would embrace all of them."

The following types are given by Roth and have been generally recognized: (1) A thickened or deflected incisor crest on one or both sides; (2) a vertical ridge in the quadrilateral cartilage a short distance posterior to the anterior border; (3) a deflected anterior border into one nostril; (4) a general convexity of the septum on one side; (5) the entire septum may be thickened, or only the upper portion opposite the middle turbinate; (6) a vomer cartilaginous deflection, where the cartilage slides downward out of the V-shaped groove of the vomer into one or the other inferior meatus, causing almost a sharp angle and a convexity to the opposite side; (7) crest deflection with tilting of the vomer cartilaginous joint into the nares of the convexity; in this form a sharp horizontal crest on the opposite side has the appearance of a spur.

The symptoms caused by deflected septum may be local and general, subjective and objective. The influence which is sometimes exerted by nasal obstruction in the production of general symptoms seems remarkable. In marked unilateral obstruction, where the septum and turbinates are in contact, the patient may have severe headache upon the corresponding side, "post-nasal dropping," persistent cough, sneezing, etc. In addition general neuroses and reflex pains are not uncommon. If the patient be asked whether "he has ever had anything the matter with his nose," he will invariably answer in the negative. Not until patency of the nasal passage has been restored does he realize that the previously existing one-sided obstruction was the cause of his symptoms.

Among other subjective symptoms may be mentioned a sense of fulness in lower portion of the nose where the septum impinges upon the inferior turbinate; between the eyes or in the "bridge" of the nose if the deflection be high; if there is irritation of the ethmoid cells pain may be noted at the inner orbital angle and over the os unguis; in high deviation frontal headache is severe in the morning and gradually improves during the day; vertigo is a rather common manifestation, and is always intensified when the patient assumes the stooping attitude or suddenly changes his position. Because of existing anterior obstruction, the secretion collects in the lower portion of the nasal chamber resulting in the formation of scabs or crusts of heavy mucoid material which can be expelled only by forcibly "blowing the nose"; the so-called "post-nasal dropping" is usually an annoying accompaniment.

Objectively there may be observed the dislocated or fractured columnar cartilage in the vestibule; osseous ridges along the nasal floor; varying degrees of inequality in the nasal lumen depending upon the type and extent of the deviation; septal convexity is present upon one side and a corresponding concavity upon the other; there is more or less marked interference in nasal respiration, and 'mouth-breathing" is common because of partial or complete occlusion of the nasal lumen. According to Bailey, as a logical effect of the deviation there may be: (a) no symptoms whatsoever; (b) acute and chronic inflammations of the nose and accessory sinuses, or the middle ear, pharynx, and larynx, with mouth-breathing and the evils accompanying same; (c) hay fever; (d) headache and general malaise.

From the foregoing it is obvious that deflections of the septum nasi are of considerable importance to the general practitioner to whom the patient usually first applies, as well as to the specialist to whom the patient is finally referred for treatment. It must be remembered that the septal deviations observed in children seldom require treatment, nor can an instance be recalled in my practice among children where the septal deformity was not associated with high-arched palate. Deflections of the septum frequently accompany enlarged tonsils and adenoid vegetations in the nasopharynx. In the majority of such cases, while the septum may never become straight, the nasal chambers usually open as the child develops.

The observation is important that few people have normal appearing nasal septa. Taking patients as they come, with or without clinical symptoms, a straight septum is rarely seen. Associated with many deviations there are osseous ridges and spurs which also contribute to obstruction; but such nasal deformities are considered pathological only when symptoms are thereby produced. Not all deviated septa should be operated upon.

This subject has been of great interest to me since adopting the modern operation (submucous resection) ten years ago. The operation has been performed in hundreds of cases with almost universally satisfactory results. Whenever one has the choice between surgery of the septum and of the turbinates, it is always wise to select the former. The nasal septum has no physiological function, excepting in so far as its mucous covering may be concerned. The turbinates, on the other hand, have important functions in connection with respiration. The removal of a small portion of one of the turbinates may do no damage, the remainder being sufficient to continue its function. Not many years ago complete turbinectomy was a popular procedure among certain surgeons; this resulted in the production of many so-called "dry-noses," "scab-noses," etc., the patient being left in a worse condition than before the operation.

In addition to correction or removal of the existing septal deformity, submucous resection may be advantageously employed: (a) in acute recurring nasal inflammations where the septal bulging is sufficient to impinge upon the turbinates; (b) in acute and chronic recurring inflammatory disorders of the accessory sinuses where septal deviation interferes with drainage and aeration; (c) in certain cases of nasal polypi; (d) in pharyngeal and laryngeal diseases for the purpose of relieving annoying symptoms; (e) in chronic middle ear disease with obstruction of the eustachian tubal lumen.

The following indications for operative intervention are given by Bailey, and are generally recognized by other observers: (1) In certain middle ear affections in which the use of the eustachian catheter is an essential part of the treatment; (2) as a preliminary to operations on the accessory sinuses; (3) as a preliminary to operations on the pituitary body; (4) where the septal bend impinges on the middle turbinate in such manner as to interfere with ventilation and drainage of the accessory sinuses; (5) where the deformity interferes with normal respiration and drainage through the nose; (6) in cases of hay fever in which there are hypersensitive areas of contact between the convexity of the septum and the adjacent turbinate; (7) where pressure of the septum against the nasal wall produces pain and headache.

The treatment of septal deviations is essentially surgical. If the patient has a deflection of the septum which needs correction, the suregon is not doing his whole duty by instituting a lengthy course of treatment, whether it be by sprays, general medication, cautery, or anything else excepting surgical removal of the obstructive lesion. As to the character of the operative procedure: there have been devised numerous operations having for their object the relief of the septal deviation, ranging from the old Asch procedure to many others much less severe. Many of the earlier operations were performed with the idea not of removing the obstructing tissue but correcting the deviation. And a certain percentage of cases are amenable to treatment other than resection of the septum, for instance, by the Gleason operation, or the Douglass method, etc. Modern surgeons, however, know that skilfully performed submucous resection will accomplish everything that can be done by any other operation, and is the most appropriate procedure for removing the deviating portion of the septum. Complete relief is afforded in the majority of cases, since no scar tissue is left with its dryness and tendency to scab, and since after removal of the distorted bone or cartilage there remains a functionating nasal mucosa. Of course the purpose of the operation is to place the septum in as near a straight line as may be possible, but this is almost never actually accomplished; in only the simplest forms of deviation can one approach the ideal result so far as appearance of the septum is concerned. The object is to remove as much of the cartilage and bone as necessary to restore the space which is impinged upon and thus relieve the symptoms; and this can be accomplished in the great majority of cases.

Submucous resection of the nasal septum can be classed as neither major nor minor surgery; and under most circumstances the administration of a general anesthetic is unnecessary. However, if the patient be exceedingly nervous, and sometimes in women and children, a general anesthetic is required. As a rule it is an office operation, but must be executed with accuracy and thoroughness. Some surgeons claim the operation can be properly completed within ten minutes, but experience has shown that on the average twenty to thirty minutes will be required to prepare the patient and complete the operative procedure; in some instances the time may be longer. By the modern method of applying cocaine or novocaine to the septal mucosa, the operation is rendered practically painless. No shock has occurred in any of my cases; one or two of the patients vomited after the operation, probably due to morphine and atropine which had been previously administered. The patient may be uncomfortable for twenty-four to forty-eight hours, but gradual improvement thereafter occurs, and recovery is complete within a week or ten days.

The technic of submucous resection of the septum nasi is less difficult than those apparently unfamiliar with the operation have hitherto believed. As already intimated, a general anesthetic is rarely required. Adequate local anesthesia may be secured by applying thin pledgets of cotton saturated with either cocaine or novocaine solution, to which has been added a small quantity of adrenalin. An excellent combination consists of five grains of cocaine crystals in one fluid drachm of adrenalin solution 1:1000. By the exercise of proper care in applying the cotton pledgets, to prevent contact with the turbinates and outer nasal walls, absorption of the drug will be minimized. The adrenalin causes sufficient shrinkage of the tissues to insure adequate hemostasis, which is an important item in the procedure. In addition it has been my practice to inject under the mucous membrane of each side from one-half to one drachm of novocaine solution two per cent. with adrenalin 1:20,000. It is unnecessary to take any steps toward sterilizing the nasal cavity, the only procedure which seems wise being cleansing of the vestibule. Swabbing this space with a fifty per cent. solution of alcohol seems sufficient.

The initial incision is made vertically extending through the mucosa and perichondrium immediately in front of the anterior border of the septal convexity; these two layers are then carefully separated from the cartilage with a flat elevator, thus exposing the area to be removed; the left index finger is then placed in the other nostril and the cartilage divided with knife to the perichondrium of the opposite side. The mucosa and perichondrium over the concavity of the other side are then elevated and the cartilage or bone removed, "leaving in its place a septum consisting of mucous membrane and perichondrium, which will possess all the virtues originally intended." After approximating the mucosal borders the nostril is packed with sterile gauze, which is allowed to remain in situ for twenty-four hours when firm adhesion will have ensued. The gauze is then removed and no further packing will be required. "Properly performed under aseptic technic there should be neither complications nor sequelæ."

The principal complications to be anticipated and avoided are infection and hemorrhage. The latter need not be discussed, as it is of rare occurrence, and the usual methods for the control of nasal hemorrhage will be found efficacious. With the exercise of adequate precautionary measures infection should be prevented. The most serious sequel is sinking of the nasal bridge. This has occurred in a small proportion of reported cases, and is nearly always due to infection. As much of the septum should be removed as necessary, but sufficient solid cartilage (at least one-fourth inch) is left along the dorsum of the nose to furnish adequate support. However, where infection supervenes, this is "melted away" and sinking of the bridge is usually inevitable.

In a small percentage of cases perforation of the septum has followed the operation. Where the perforation is situated anteriorly and is small in size, the result may be a "whistling nose." When, however, the perforation is far backward, the patient experiences little or no discomfort therefrom. The appearance of the mucous membrane frequently indicates whether or not perforation need be feared. We frequently see, especially in those patients who have been in the habit of "picking" the nose, a grayish unhealthy appearing membrane on the concave side of the septum. It has been my experience in several cases of this class that perforation followed operations in which there was no departure from a perfect technic.

The question is often asked, what happens after the operation, *i. e.*, is there ever a re-formation of resection revealed a fibrous septal structure. In the nasal septum? The cartilage and bone removed are never regenerated. A few post-mortem examinations performed upon patients after submucous completing the operation the two mucous surfaces are carefully approximated and held in place by means of the packing until they become adherent. Fibrous tissue forms between these mucous layers, replacing the cartilage and bone, and producing a septum which is pliable and one which performs the function of a normal septum.

An argument which might be used against submucous resection is, what would happen if the patient sustained an injury to his nose subsequently? I am unaware of any reported cases where serious results accrued from a below on the nose after the operation, but this might be a possible objection to the procedure.

For obvious reasons the operation is contraindicated in the aged and the very young; in individuals with acute middle ear and pharyngeal lesions; in the presence of active tuberculosis, syphilis, and other grave systemic diseases.

REFERENCES

Bailey: Jour. Mo. St. Med. Assn., 1916, xiii, 59.
Lewis: New York Med. Journal, 1915, ci, 736.
Newcomb: Reference Handbook of Med. Sci., 1903, vi, 125.
Roth: Northwest Medicine, 1915, vii, 223.
Simpson: American Jour. of Surgery, 1916, xxx, 5.
Townsend: Jour. Ophthal., Otol. & Laryn., 1915, xxi, 516.

SEPTAL HEMORRHAGE; ITS CURE BY SUBMUCOUS ELEVATION.

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The steps of this procedure are:

1. Induction of analgeso-ischemia (this term is suggested for the state which follows the local application of cocaine and epinephrin or their substitutes, and its adoption is urged as being more comprehensive than the terms generally in use).
2. Incision and elevation of the septal muco-perichondrium backward for one inch and down to the floor of the nose.
3. Compression of the elevated membrane between the blades of a special forceps.
4. Replacement of the flap and packing in the usual manner for from twelve to twenty-four hours.

Indications for operating:

1. Cases of septal hemorrhage which resist ordinary methods of treatment, such as cauterization, astringents, etc., and those in which no bleeding point can be readily found.
2. Cases of chronic crusting of the septum accompanied by bleeding.
3. Cases of septal hemorrhage of mild or severe degree in children who will not tolerate local treatment and who are best operated upon under general anesthesia.

The principle of cure is obviously the destruction of the thin-walled, superficially placed vessels which bleed at the slightest provocation, and the ability to grasp the vessel between the blades of a forceps constitutes a distinct advantage, since pressure crushes the intima of the vessel, and obliteration of its lumen is thus accomplished.

The bleeding points are usually low down and anterior, consequently the incision should be placed as far forward as possible, and the elevation carried well down to the nasal floor.

If it is found difficult to reach with the compression forceps the vessels near the floor of the nose, a horizontal incision should be made along the floor joining the lower end of the vertical incision, or, in other words, one makes an L-shaped flap all parts of which can readily be compressed. These two incisions sever the continuity of the vessels passing through Stenson's canal, and those which pass into the mucous membrane from the maxillary crest.

Some of the vessels are of considerable size, and their anastomosis is so free that cauterization often fails to accomplish a cure.

In cases of chronic crusting accompanied by bleeding, the membrane is bound down by fibrous bands which interfere with the circulation, and cause distention of the vessels at one point and constriction at another.

When these bands are divided by the elevation the blood supply readjusts itself, becoming more nearly normal, and the general tone of the membrane is decidedly improved, with a lessened tendency toward crusting.

This improvement has been noted after the submucous resection both by me and by others, and will be referred to later.

It is easier to operate between attacks, but if other means fail one can usually check the bleeding in the following manner and operate immediately:

A pledget of gauze soaked in a 10% solution of cocaine in 1:1000 epinephrin solution is placed in the bleeding nostril while the *opposite* septal surface is painted with cocaine-epinephrin syrup (55% strength), the object being to secure a reflex vasomotor constriction of all the neighboring vessels.

If oozing still continues the bleeding side may be packed firmly with oily gauze, which will allow but little blood to escape, and while still in situ, incision and elevation underneath the packing may be carried out. Unless the case is one of marked hemophilia, no further difficulty will be encountered.

Overaction of the heart due to extreme nervousness is apt to cause continued hemorrhage, and a hypodermic of morphine and adrenalin in proper proportions will check the bleeding and quiet the patients' fears.

A good balance is 1-6 grain of morphine sulphate dissolved in 10 minims of 1:1000 solution of adrenalin. If more adrenalin is used the morphine should be increased to prevent excessive rise in blood-pressure.

Morphine dilates the medium-sized vessels, at the same time slowing the action of the heart, thus lowering general blood-pressure.

Epinephrin increases the force and frequency of the heart beat and this action added to the contraction of the peripheral vessels raises the pressure.

By giving the drugs together the desired effect of both is obtained, viz., lowered blood-pressure and contraction of all of the small bloodvessels, owing to the predominant action of the morphine.

Children and nervous adults may be given a general anesthetic if necessary and the anesthesia may be limited to the primary stage if the septum is painted with cocaine-adrenalin syrup.

Shock and bleeding are considerably lessened when local analgeso-ischemia is added to the general anesthesia.

Ligation of the bleeding vessels has been suggested by some writers, but the membrane is usually so friable that such a proceeding must be attended with considerable difficulty.

A smooth flat-bladed angular forceps has proved most convenient for compressing the membrane, but an ordinary dressing forceps answers almost equally well. Care should be taken not to use sufficient pressure to cause necrosis and sloughing.

The wound edges may be brought together with sutures if one cares to spend the time upon this refinement of technic. Usually healing occurs promptly upon replacement of the flap and in the writer's series there has been no instance of perforation or other untoward result.

A convenient method of packing is with strips of oily gauze introduced in successive layers with a piece of rubber-tissue placed next to the wound.

If packed in this manner the strips may be removed in reverse order and without danger of disturbing the wound edges.

The after-treatment is that usually given resection cases, simple cleansing and protection of the wound with boric ointment or some similar preparation.

J. A. Thompson in the *Laryngoscope* of October, 1914, and Joseph Prenn in the *Boston Medical and Surgical Journal,* January 28, 1915, both cite cases of septal hemorrhage cured by submucous resection of the septum.

My experience, however, based upon 41 cases of submucous elevation with compression leads me to believe that resection of the cartilage is unnecessary unless, of course, indicated because of nasal obstruction, or for other reasons; in other words, elevation and compression of the muco-perichondrium will cure practically all cases of septal hemorrhage.

In the opinion of many rhinologists, resection of the septum should not be undertaken when the patient is less than 16 years of age, and since many of our cases of epistaxis occur in children, a method which will not interfere with septal development is preferable.

In the transactions of the 1916 meeting of the Oto-Laryngological Section of the American Medical Association, there is printed a paper by Chester C. Cott of Buffalo, entitled "Xanthosis and Other Septal Hemorrhages". The treatment is somewhat similar to the one just described, and consists of incision and elevation of the muco-perichondrium followed by the introduction of iodoform gauze which is snugly packed between the septum and the perichondrium. This is left in position for two days and replaced if bleeding follows its removal.

He reports 38 cases, all of which were ultimately cured.

The introduction of packing between the septum and elevated flap seems to us unnecessary, and the possibility of causing recurrence of the hemorrhage when the packing is removed would seem to be a disadvantage.

Most of my cases are private patients and have been seen from time to time during the past three years. The first private case was operated upon December 4th, 1913, although several cases had been previously operated upon during the earlier part of 1913 at the Vanderbilt Clinic.

All of the patients have been free from recurrence of hemorrhage except one, a woman aged 75, whose blood pressure was 230 at the time of operation. The bleeding was checked at the time, but recurred six months later. Re-operation resulted in permanent cure. The question often arises whether it is advisable to check a moderate degree of bleeding in cases of this kind. This patient insisted upon having relief from the inconvenience of repeated attacks of nose-bleed, although, probably these were merely physiological.

One of the series was a case of acute hemophilia, possibly due to pyorrhea alveolaris. The patient was a stock-broker aged 48, somewhat alcoholic and otherwise careless of hygiene, although his blood pressure was not excessively high.

Elevation and compression checked the bleeding from the anterior portion of the septum, but two days later blood appeared in the pharynx, and a bleeding point was discovered in the posterior portion of the inferior turbinate. Fresh blood also appeared in the stools and evidently came from the lower bowel. He was given several injections of human blood-serum by Dr. J. E. Welch of this city, and the hemorrhage ceased, although it was deemed advisable to keep the nose packed for about two weeks. Later on the pyorrhea was treated and up to the present time, a period of about one year there has been no recurrence of bleeding.

Several of my colleagues at the Vanderbilt Clinic have successfully used this method of treating septal hemorrhage and have been able to verify the permanence of the cure in all cases which could be followed up.

SUMMARY.

The object attained by incision and elevation of the muco-perichondrium is free surgical access to the bleeding area, and the rational treatment of a bleeding vessel is compression, causing obliteration of its lumen.

Compression *en masse* with a flat-bladed forceps reaches all parts of the membrane and if thoroughly done results in permanent cure.

It is one of the most satisfactory methods of managing cases of septal hemorrhage in children, since the operative treatment is completed at one sitting, and no prolonged after-treatment is required.

Although the number of cases reported is comparatively small, the evidence adduced, is so favorable to this method of operation that it is confidently recommended as a routine procedure in appropriate cases.

AN INFLATABLE RUBBER BAG FOR INTRANASAL USE.*

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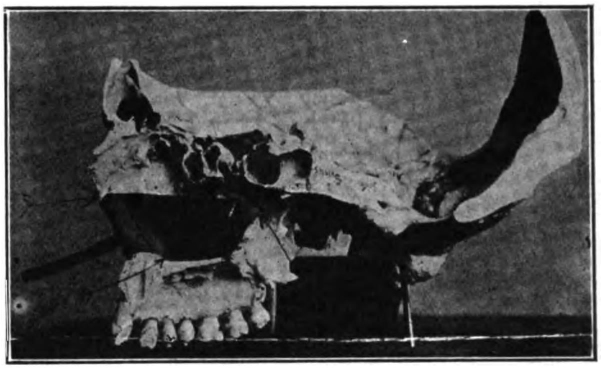
A strong desire to overcome the severe pain and discomfort incident to the use of gauze when used as packing in the nose led to the conception of the inflatable rubber bag.

Description: It is made trapezoidal in shape, not because of preconceived notions, but because this was the shape evolved from patterns taken from the skull. As a result the bag conforms to the shape of the nasal interior.

It will be observed that the two shorter borders, or ends, are reinforced by an extra thickness of rubber stock, so that when it is in position and inflated, there is no bulging forward out of the vestibule or backward into the postnasal space. It will also be observed that the breadth is not sufficient to reach from the floor to the roof of the nose. The result is that when in position it does not make contact with the upper third of the nasal interior. This was provided to avoid the undesirable effects of pressure in this region. The interior border is so shaped as to make accurate contact with the whole length of the floor of the nose. This is important as it helps to keep the bag in the nose, and after septal resection it keeps in place the membrane which had been elevated from the floor. The anterior border lies in the plane of the anterior bony nasal opening, and the same applies with regard to the posterior border.

In order to meet all requirements three sizes are obtainable. The arrows in the photograph show the mechanics of retention.

The tubing is long enough, three inches, to permit folding when it is tied. The method of insertion is optional. My custom has been to slip the tubing and bag over a stout nasal applicator, lubricate, and insert by carrying it back along the floor of the nose. I have also used forceps, but prefer the applicator. In doing this one must avoid puncturing the rubber. As a lubricant I use lubricating jelly rather than vaseline because the latter will rot the rubber. For inflating I use an ordinary metal ear syringe, and for tying, umbilical tape. It requires only slight distention, one being guided somewhat by the patient when not under general anesthesia. Too much pressure soon becomes painful. It is surprising how little pressure is required to stop bleeding from a small vessel, artery or vein, when the force is applied perpendicularly to the area, and continuously positive. Such continously positive pressure cannot be obtained with gauze, and besides it is never perpendicular to the surface.



A word about sterilization. Do not sterilize the bag in bichloride of mercury solution because it is impossible to get all of this off again without washing for a very long time. The corrosive action of the mercury bichloride is almost certain to occur. It is better to boil in saline solution for at least three minutes just before using.

Uses: (1) As a splint; (2) For the control of hemorrhage.

Splint: Fractures of the nasal septum, when seen soon after the injury, may be replaced by means of the bag. In such cases the bag is inserted in the side toward which the displacement took place, and then it is suddenly and forcibly inflated with air. The suddenly distended bag produces pressure on that side of the septum in a direction perpendicular to its surface, with the result that the septum is suddenly replaced to its former position. There is frequently at the instant of replacement an audible crepitus. This crepitus is, of course, not heard if there are soft tissues caught in the line of fracture. As this procedure is very painful a general anesthetic should be administered. The bag should remain in the nose from 24 to 72 hours under very moderate distention, when it may be removed and left out. One patient whom the writer did not expect to see again had this work done without an anesthetic, and the bag immediately removed. Subsequent information disclosed the fact that nasal breathing was not obstructed on either side and it was assumed that the septum remained in the corrected position.

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*Presented before the Section on Laryngology and Rhinology, New York Academy of Medicine, November 22, 1916.

The most frequent call for the use of the bag as a splint is after the submucous resection of the septum. It is here that it displays its great advantages over gauze; these are, ease of insertion, freedom from pain if the distention is not too great, ability to vary the pressure without disturbing its position in the nose, the comparatively short time it is permitted to remain in the nose, ease of removal, and the comparatively slight bleeding at the time of removal.

Ease of insertion: By this is meant the ease with which the operator can make the insertion of the deflated and lubricated bag, and the absence of the slightest discomfort to the cocainized nose, the bag automatically assuming the correct position.

Freedom from pain: This applies not only to the absence of pain during the act of inserting, but also to the absence of pain during the time the inflated bag is in the nose. Here, another word of caution about putting in too much pressure.

Ability to vary the pressure: Should the pressure be too great it may be easily reduced without disturbing the bag in the nose.

Time it is permitted to remain: After submucous operation, from 6 to 12 hours; my custom has been to remove after 6 hours, as a result of which early removal the patient spends a more comfortable night with a certain amount of nasal breathing. Drainage from the sinuses is thus not interfered with except from the swelling of intranasal structures incident to and following the operation. In some cases there is a little oozing when the pressure is released. Allow the deflated bag to remain *in situ* for 5 or 10 minutes, after which it may be removed. In the event of severer bleeding it would be very simple to reinflate, and permit the bag to remain several hours longer; or, one bag might be removed, and the other, the one on the side the incision was made, left in under slight distention. Obviously, after this operation a bag is inserted in each side, and the bags equally inflated.

Ease of removal: By this is meant absence of pain to the patient, and the ease with which the operator is able to extract the bag. Mechanically it is similar to the exit of the shoulders of the child in an obstetrical case, i. e., anterior or upper shoulder first.

The use of the bag is indicated after my operation on the nasal septum where some form of splint is desired to hold the parts in position, or to prevent bleeding. In this connection may be mentioned submucous removal of spurs, and plastic operation for correction of septal perforation.

For control of hemorrhage: It is understood that when, as described above, the bag is used as a splint it is also working as a control of hemorrhage. The two functions are accomplished at the same time. The trauma to the nasal mucous membrane is, in my hands, much less than that produced by gauze or any other form of splint or packing that I have ever used. With the correct pressure it is negligible.

A frequent use for the bag will be found in cases of spontaneous epistaxis regardless of cause. In these cases it is the easiest and most certain means of control that can be used, and will be greatly appreciated by the general practitioner. It is as certain with arterial as with venous hemorrhage. The most frequent site from which epistaxis occurs is Kiesselbach's space on the anterior part of the septum. In those cases where there is bleeding simultaneously from both sides the bags are a great comfort, as one may be inserted in each side, and all bleeding stopped. In these cases it is dangerous, on account of the possibility of producing perforation, to perform any kind of cauterization or operation on both sides at the same time, and we have heretofore been compelled to pack at least one side. The bag should be left in the nose from 12 to 24 hours, over night. In several cases I have removed it after 6 hours, and in one case after 3 hours, without recurrence of bleeding in any case. In cases of epistaxis on adults with high blood pressure the use of the bag should be governed by blood pressure and hemoglobin readings. I allow myself to be governed by three considerations, viz., clinical symptoms, hemoglobin and blood pressure readings. I do not insert bags until the blood pressure has been markedly reduced, or unless there is threatening syncope from loss of blood. Having had no hemophyliacs to treat is is impossible for me to make a statement as to its efficiacy in these cases.

It has been my experience in cases where the bleeding is coming from an artery, that is is impossible to stop it by any method of cauterization. The usual result of the attempt is an increased bleeding. It is my custom to cauterize the spot with the galvano-cautery as quickly as possible, and immediately insert a bag. This is permitted to remain in the nose over night. On removing it the next morning a well cauterized area will be disclosed, and usually no further cauterization will be required.

44 Centre Avenue.

TUBERCULOUS MASTOIDITIS: RADICAL OPERATION UNDER COCAIN ANESTHESIA.*

Harold Hays, M. D., F. A. C. S.
New York City.

About two years ago, Mr. S., age 24, consulted me about his deafness and sharp pain in the right ear. He had had a tuberculosis of the lungs which at the time of examination, was in a quiescent state. He had had a radical mastoid operation performed on the left ear and mastoid four years before. This had never healed properly with the result that there was a large opening in the mastoid cavity, constantly suppurating, which lead down to exposed dura.

The right side showed granulations in the middle ear, entire destruction of the drum and the discharge of cheesy pus. Culture from this ear and from the sinus behind the left ear, showed numerous tubercle bacilli. The patient could hear neither watch nor tuning fork at either ear.

During that first winter, I had him under observation two or three times a week, during which time I attempted by every known means to clear up the condition. Cleanliness, stimulation and injection of mixed vaccines did little good. In the summer of 1915, his health deteriorated so greatly that he had to leave for the West. Last spring I received a message that his right ear and mastoid were paining him greatly and so I had him return to New York for further observation.

Examination at this time showed no material difference in the ears except that the process in the right ear seemed more advanced. I advised a radical mastoid operation.

The question of anesthesia was an important one. Here was a patient with a quiescent tuberculous process in his lungs, whose general physical condition was far below par. Ether narcosis would possibly light up his lung condition. I determined to operate upon him under local anesthesia.

On the day of the operation, at ten o'clock in the morning he was given a hypodermatic injection of morphin gr. 1/4, atropin gr. 1/100. Two hours later, a second injection of like amount was given. At two o'clock he was brought to the operating room. As there were no signs of opium poisoning, another injection of morphin, gr. 1/8 was given. The operative field was prepared in the usual manner. An injection of a solution of cocain, 10 per cent, with equal parts of adrenalin, was made along the line of the proposed incision, going well into the surrounding tissues, forward to the lobe of the ear, upward to the zygoma and backward to the occipital bone. An attempt was made to have the injections reach down to the periosteum. This is not a difficult matter in this region as the tissues are not very thick.

The semilunar incision was made throughout its whole extent down to the periosteum. A longer needle was attached to the hypodermatic syringe and an injection made under the periosteum of a 1/2 of one per cent cocain solution with equal parts of adrenalin (Shleich infiltration). Two or three drams of this solution were injected, care being taken that some of it reached the periosteum below the tip and anterior to the bony canal. It was spread through the tissues posteriorly and above until an area of at least three to four square inches was infiltrated.

The periosteum was then incised and scraped back with a raspatory. The retractors were inserted. Let me say here that a great deal of pain may be caused by sharp retractors which dig into tissues not anesthetized. Dull retractors may be used: but where definite areas of pain are found, it is better to inject more cocain.

After the bone was well exposed, the mastoid cavity was uncapped with a chisel. The patient complained of no pain at any time while I was working in the mastoid cavity. It is unnecessary for me to go into the details of the operation—a Schwartze-Stacke—except to say that the cavity was extremely large, the bone extremely hard, and the tip entirely destroyed so that it had to be removed in its entirety. When I asked the patient to describe his sensations to me, he stated that he felt no pain, only the apprehension of pain similar to what he would feel in the dentist's chair. We are wont to feel that in the mastoid operation under ether anesthesia, the constant chiseling and use of rongeurs produces a slight concussion of the brain which accounts for the lessened amount of ether we have to give. After this experience I am inclined to think that this notion is untenable. The constant pounding of the bone produced no marked change in the patient's mental condition. In fact he did not seem to mind it at all.

The mastoid cavity was thoroughly cleaned out without any trouble. The bony canal wall and the bridge over the antrum were removed without any pain. But when the sensitive mucous membrane of the middle ear was reached, trouble commenced. We had been unable thus far to cocainize this membrane. Here was a mass of sensitive granulation tissue. In order to overcome this sensitiveness I injected a four per cent. cocain solution along the posterior canal wall, into the granulations themselves and deep down into the Eustachian tube. Not all sensitiveness could be overcome but enough to proceed with the operation with little trouble. The mass of granulations were removed with a curette until I came to a thicker, tougher mass apparently attached to the internal wall of the middle ear. I hesitated to remove this as I realized that the facial nerve was either in it or close by. But the mass was infected and had to be removed. I grasped it with forceps and snipped it off with small scissors. At once the patient exclaimed "You must have hit my facial nerve. The right side of my face is paralyzed." Such was the fact.

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* Presented at the Otological Section, New York Academy of Medicine, October 13, 1916.

I curetted out the Eustachian tube and easily made a skin flap for a new canal. The making of the skin flap was facilitated by the lack of bleeding, due to the blocking off of the vessels by the cocain solution. When one realizes how much bleeding there usually is, he can understand the value of this ischemia. After making the artificial canal, the posterior wound was closed with tendon sutures.

Three hours after the operation the patient sat up in bed to eat his supper. Having had a radical mastoid operation performed on the other ear under ether anesthesia he was in a position to make comparisons. He was most enthusiastically in favor of local anesthesia. Not only had the general reaction been severe at the time of the former operation but his wound pained him a great deal. In this instance, the pain was practically nil. At the end of the week he left the hospital with his wound in excellent condition. The facial paralysis began to improve so, evidently, the nerve was not completely severed.

A few months ago I lost track of the patient. But the other day I received a letter stating that he had died at Bellevue Hospital during the summer from a tuberculous meningitis. Autopsy showed a direct extension of tuberculosis from the suppurating cavity behind the left ear (the first one operated upon) to the dura.

The practical points to be deduced from this case are the following:

1. That the radical mastoid operation can be done under local anesthesia without any pain.
2. That the superficial scalp tissues and periosteum are sensitive, but that bone has absolutely no sensation.
3. That the mucosa of the middle ear is extremely sensitive and must be separately cocainized.
4. That irritation or destruction of the facial nerve is immediately noticable to the patient.
5. That the immediate after-effects of the operation are practically nil.
6. That the end-result is just as good under local as general anesthesia.

11 West 81st St.

Tonsillectomy for Athritis.

Years ago it was the tonsils; when these were removed the arteriosclerosis would be relieved, the rheumatism cured, the arthritis deformans checked. Now we know that the tonsils may be organs of elimination of bacteria and toxins as well as foci of infection and that their indiscriminate removal is not to be advised. As good a man and experienced an observer as the clinical professor of pathology in one of our largest medical schools states that the worst cases of chronic rheumatism and its sequelæ he has seen, have occurred in individuals who had had their tonsils removed in youth; and he unqualifiedly condemns this procedure as lessening one's immunity to infection.—Martin J. Synnott in the *Medical Record.*

NOTES ON THE SURGERY OF FOREIGN BODIES IN THE INTERIOR OF THE EYE.

J. Herbert Claiborne, M.D., F.A.C.S.,
New York.

In order to set forth the surgical management of foreign bodies in the interior of the eye, I cite what I conceive to be three illustrative cases, two of magnetic foreign bodies and one of a non-magnetic. Of the first two, the attempted extraction was attended by success in one, by failure in the other; it was also a failure in the third. In all, however, the results may be said to have been excellent from a surgical standpoint.

Case I. On April 2 I saw L. N., 38 years of age, a baker, who was referred to me by Dr. H. W. Inglin of Freehold, N. J. About a month before I saw him, while hammering a metal hoop on a barrel, he was struck in the right eye by a small piece of metal which he assumed came from either the hammer or the hoop. He did not suffer a great deal of pain nor was his eye much inflamed afterward, but his sight became rapidly dim in that eye and when I saw him a month after the accident his lens was almost entirely opaque and he could see only movement of the hands in front of the face. The eyeball was but slightly pink and was painless, nor was there any pain on pressure. The diagnosis was made of probable metallic foreign body in the interior of the eye, and this was rendered more likely by the existence of a small scar on the cornea a little upwards and outwards, although there was no injury, as far as could be seen, to the iris. In order to make certain the patient was referred to Dr. George T. Dixon, who made roentgenograms and plotted out the position of the foreign body. The foreign body had apparently passed through the cornea, and into the lens in which it was caught, and remained sticking, a portion of it projecting into the vitreous humor; while the rear end, a little blunter than the anterior, remained caught in the substance of the lens back of the equator. The question at once arose, whether it was wise to attempt to remove it.

In view of the well-established fact that foreign bodies remaining in the lens produce but little irritation and rarely set up destructive inflammation of the eye, I was inclined, at first, to leave the eye alone, but in the nature of things a foreign body in any location should, if possible, be removed. In addition, the patient desired it to be removed, and people in general object to having things located in their anatomy which do not belong there. As long as the man's other eye was sound and he had no pain in the injured eye, the temptation to withhold my hand was strong. Nevertheless, I felt myself compelled to proceed by the formula and in accordance with accepted doctrine. To that end he was sent to the hospital and prepared for operation. Cocaine was used because the co-operation of the patient is necessary in the procedure of extracting foreign bodies from the interior of the eye.

The eye having been cocainized and the non-magnetic speculum introduced, the patient being in a sitting posture on a table, the sterilized apex of Haab's giant magnet was brought almost in contact with the cornea, when the iris was seen to bulge slightly downward and inward. In a few seconds, the foreign body leaped up from behind the iris and lay flat against the back of the cornea. The magnet was then removed, on the assumption that the splinter of steel or iron would drop to the bottom of the anterior chamber; singularly enough, however, instead of doing so, it jumped back behind the iris and disappeared. Although the pupil was quite widely dilated with atropin it could not be seen. The procedure was repeated and three times the steel leaped back and out of sight. A section was then made with a lance-shaped knife below and a small iridectomy was performed. The magnet having been applied to the open wound the foreign body was brought directly into view, but it did not come out. Johnson's magnet was now used and the curved tip being introduced into the lips of the wound, it was easily extracted.

The patient recovered from the operation in surprisingly short time, the wound healed by first intention, and within a week the eye was not even pink. The cataract was rendered a little more dense, and of course the patient was dissatisfied because he couldn't see—although it had been explained to him beforehand that the operation was not done for the purpose of giving sight. The eye has remained quiet ever since. It was then explained that the cataract could be removed and he could be made to see with that eye, but he had had enough and was content to ply his trade with one eye. The foreign body was about 4 mm. long and 1.5 mm. broad; one end was sharper than the other.

A different procedure might have been employed in this case, viz., the removal of the cataractous lens and the foreign body with it, but since the foreign body was sticking into the vitreous and only about one-half of it was caught in the lens, I feared that, in removal, the lens might come away and the foreign body remain. This probably would have happened in the ordinary method of extraction, that is, the extraction without the capsule. The Indian operation, or extraction with the capsule, alone would have been indicated here. It is unlikely that even that would have succeeded completely, first, because the operation is difficult to perform, and second, because the eye having already received a certain injury, the healing might have been delayed or prevented by the original trauma, for it is well recognized that preceding trauma lowers the vitality of tissues in general.

As the matter now stands, the lens can be extracted by section below with ease and probably with complete success.

On the whole, I believe the case has been conducted along the safest lines, and though the patient takes great satisfaction in demonstrating the foreign body to friends, he is thoroughly discontented, which, however, is nothing unusual.

Case II. A man of 18, on May 17, 1916, was struck in the right eye by a portion of a Remington cartridge which rebounded from a disc of steel at which one of his comrades was firing. There were three young men present. The first fired at the metal disc at a distance of five feet, and next to him on his right, stood another. My patient, fearful of being hit, got behind the two and in the rear of a radiator through which he looked at the performance. When the shot was fired something struck him in the right eye which must have passed between the head of the firer and the man on the right and through one of the interstices betwen the convolutions of the radiator. After all his precautions, he was struck and the other two escaped!

I saw the patient the next day. There was in the cornea a ragged wound running from near the center downward and inward to the edge of the cornea, extending slightly into the sclera. The lens was milky and disorganized. The iris was caught in the lips of the wound and drawn to the edge of the cornea. The anterior chamber was evacuated and the rest of the iris lay against the back of the cornea. The eye was but slightly pink and was painless, which is usual after extensive and severe injury to the cornea when it is perforated, whether the wound be lacerated or clean-cut. He had no fear of light and came with his eye unbandaged. After hearing the history I thought it probable there was a foreign body in the interior of the eye, but what the nature of it was was something of a problem. The Remington cartridge consists of lead, steel, and one or two other metals in small proportion. If the foreign body was steel or any other magnetic metal the chance of removing it by a magnet existed; if not, I quickly made up my mind not to attempt to remove it. I explained the situation to the parents, stating that the patient had one of three or four chances of the foreign body being magnetic, and that I thought we should give him the chance of removing it in that way, although it was slight. His eye therefore was subjected to the giant magnet, but as there was no movement whatever of the iris when the point of the magnet was laid against the cornea, and the same maneuver failed after several attempts, I decided the foreign body was probably non-magnetic and more likely lead than anything else.

Before the attempt the patient was sent to the hospital for roentgenograms, but owing to his moving his head during the taking of the picture the foreign body could not be definitely located. Nevertheless, the roentgenographer informed me that there was certainly a foreign body in the eye. Hence, I applied the magnet as soon as possible.

The magnet having failed, I attempted a clean iridectomy by making a section at the corneal margin, but owing to the anterior chamber being eliminated, it was difficult to grasp the iris as neatly as I wished, and so had to content myself with removing small bits, opening the corneal wound, cutting away the threads of iris caught there, and syringing out the anterior chamber with normal saline solution. A drop each of argyrol and atropin solutions were instilled and the patient put to bed.

The eye healed with great rapidity and the patient was without any pain whatsoever throughout the healing. In six to eight weeks the lens had become completely absorbed; the corneal wound had healed so that there was almost no scar except at the edge. The pupil was pear-shaped, running downwards and inwards. Owing to the rapidity of the healing, I assumed a mistake had been made in locating the foreign body and had another picture made. I believed the body had passed through the eyeball completely and was located behind the eye in the orbit, but the second roentgenogram made by Dr. Dixon disclosed a foreign body hanging in the vitreous just in front of the optic nerve. Dr. Dixon estimated the size of the metal as about 2 by 3 mm., and requested me to examine the eye critically under atropin. This having been done, the foreign body was seen clearly in the vitreous humor just about where he had located it. From its appearance, I assume it was encysted and from its non-irritating character I assumed it to be lead. This was more likely than that it was any other metal, for I have ever found lead is borne more kindly in the interior of the eye than any other foreign body except glass. Fortunately, the posterior capsule had a rent through which, under correction, the patient was able to see 20-30 plus. The extraordinary thing is that it lodged exactly where it did, went no further, and became encysted. It must have entered the eye very hot, hence aseptic. To these facts I attribute the quiet condition of the eye following the trauma and the operation, the absence of vitreous cloudiness around the foreign body and the good sight. I do not believe it will migrate after the manner of copper and I think the boy will have a quiet eye as long as it stays where it is. The patient works at his trade as high-class mechanic, the eye is quite painless, and the difference in vision of the two eyes does not annoy him. I have counseled against his using correcting glasses as I have rarely found glasses borne with comfort when the lens has been lost in one eye.

It is difficult to imagine a happier outcome of any case. In my opinion the fortunate result was due partly to the aseptic character of the foreign body, which was lead probably, and to the fact that the operation was quickly done after the injury, and that all shreads of iris were freed from the lips of the wound, and that the anterior chamber was thoroughly irrigated with normal saline solution.

Case III. M. W., a man of 63, was struck in the left eye by a small piece of steel on January 10, 1916. He did not go to the hospital until ten days before he was seen by me, which was on the third day of March. I found a slight scar on the cornea upwards and inwards and a very small hole in the iris corresponding. These were the only signs of external injury. The lens was completely cataractous and swollen. The eye was painless and white. He said it hurt a little when he used the other eye. The right eye was normal with normal vision. Roentgenograms had been made on February 28th, and a small foreign body was found practically in the same location as was found afterwards on May 11, 1916, when the case was in my hands. When first seen the case was in the hands of Dr. Lambert of the New York Eye and Ear Infirmary. The roentgenograms taken on May 11th, after the operative attempt to remove it, show a slight change in the position of the foreign body.

It was questionable in view of the quiet condition of the eye, when I first saw the man, whether it was advisable to attempt to remove the foreign body, both because the eye was so quiet and because the foreign body was so small. The patient was certain it was a piece of steel, and following the formula in such cases I attempted to extract it by means of the magnet. A few days after I had seen him, he was subjected to the giant magnet at the hospital, when it was distinctly observed by both my assistant and me that the iris bulged forward when the magnet was applied, but the foreign body could not be brought into the anterior chamber. As it lay to the nasal side of the vertical meridian an iridectomy was performed at that point in the hope that the body had become entangled in the iris and might be removed when the iridectomy was done or be extracted by means of the magnet. The piece of iris, when cut away, was examined carefully without any sign of the body being found. It did not appear either when the giant magnet was laid at the lips of the wound nor when the tip of Johnson's magnet was inserted between the lips. I caught a glimpse of what I conceived to be a minute foreign body on the upper inner quadrant of the surface of the lens, but I was unable to grasp it by forceps nor did it attach itself to the point of the magnet. I therefore concluded it was a piece of iris pigment. These manipulations naturally ripened the cataract and caused the lens to swell, although the wound healed rapidly. At the end of about a week the eye was intensely red, there was marked iritis, the lens completely filled the anterior chamber and the tension had increased to plus three.

The temptation to remove the lens by section was very great. The difficulties of achieving this were obvious, on account of the swollen lens. Moreover, I reflected that the eye had been subjected to trauma once by the accident and again by the operation. In the face of authority, I decided to withhold my hands. From this time until May 30th, the tension varied, the iritis receded and reappeared, from time to time, until I became almost desperate and again was tempted to operate. Just after May 30th I thought I detected a slight shrinking at the edge of the lens just in front of the iris, which had in a measure become constricted behind the lens—the latter filling the anterior chamber. I regarded this as a favorable sign and thought the lens would rapidly absorb. By way of a prediction, I stated in my notes there would be complete absorption of the lens within a month. Within a month from that date, the lens had completely absorbed with the exception of a small chalky lump in the inner side. Nevertheless, from time to time, there was a recurrent iritis with alternate increase and decrease of tension. Finally the eye became white and quiet.

At first I was unable to get more than 20-200 with correction. On September 5th, however, the patient had 20-40 plus with 13, no stigmatism being evident. Through a rent in the capsule, the background of the eye could be seen and the retina and optic nerve appeared to be normal. The small chalky deposit referred to remained, but was out of the line of vision. The patient had hyperopia of plus 1 on the right, and with plus 13 for his left, he saw for distance and reading with comfort. He was completely satisfied, contrary to the rule, and pursues his former business without any trouble in vision, or any pain, from the use of his eyes.

The position of the foreign body, as shown on May 11th, was a little different from that shown on February 28th. This may have been due to the effect of the magnet or may have been due to difference in the calculation of the roentgenographer. It is approximately where it was in the beginning, which is to say, at the point where the cornea emerges into the sclera. The tissues at this point, as well known, are very tough and I do not doubt that it had become so intimately attached to them that the magnet could not draw it away. That the iris was bulged forward when the magnet was applied can certainly be vouched for by my assistant and myself. I believe the foreign body will cause no further injury to the eye, and that its position will not alter with time. The question now arises as to whether it was wise to have attempted its removal. Might it not have been better, in view of the quiet condition of the eye, to have simply extracted the cataract? While this might have been better, no one knows it, and we can only point to the result as most fortunate and satisfactory. The satisfaction I get out of the case is first, the bald result, second, what I conceived to be the delicacy with which the indications were met during the rise of tension and the iritis, and third, my resistance to the strong temptation to operate a second time.

A great impetus has been given to the study of these cases by the invention within the last ten years of the giant magnet. The credit for this is due to Haab. With the power of thirty ampères the pull of the magnet is about thirty pounds to the square inch sectional area when the object is situated about one inch from the apex of the magnet. This, of course, is based on the assumption that the foreign body is in the background of the eye and on the recognized fact that the eye in general, is about nine-tenths of an inch long.

Antecedent to the invention of this magnet a number of hand magnets had been constructed, the tips of which were ordinarily thrust into the wound of entrance. Several delicate instruments called sideroscopes have been constructed, based upon magnetic attraction, by means of which the presence of magnetic foreign bodies in the interior of the eye can be recognized. There was, however, no power to locate the position of foreign bodies in the eye inherent in these inventions. To Pooley, unquestionably, the credit for constructing the first sideroscope is due. This invention gave inspiration to other observers which resulted in the Haab giant magnet and a number of powerful hand magnets, of which latter, in my opinion, the Johnson magent is the best. But success in removing foreign bodies from the interior of the eye is dependent not only upon the knowledge of the pulling power of the given magnet but largely also upon the localization of the foreign body by means of the roentgen-ray. As can be seen by the charts attached to this article, localization can be done with the utmost accuracy. An error of no more than one to two mm. may be counted on.

A number of men throughout the country have acquired great skill in the localization of interocular foreign bodies, and to them most of us send our patients. It is bootless to go into the history of this matter any further.

When we reflect that 75 per cent. of foreign bodies in the interior of the eye are magnetic, we recognize the great advance which has been made in this direction in the surgery of the eye. The other bodies which are found with less frequency are stone, wood, glass, lead and copper. The last is becoming more and more infrequent, the further we get away from the days of the percussion cap. In an experience of thirty-four years, for example, I have never had a case of copper in the interior of the eye.

It seems that the irritating quality of foreign bodies is dependent in the first place upon their nature, and second, upon whether they are septic or aseptic. Copper, for example, is known to be very irritating whether septic or aseptic, and according to distinguished authority it is given to migrating from place to place in the interior of the eye. Lead is quite frequently found and my experience with it has been rather exceptional. Iron and steel are irritating by reason of the fact that they become oxidized, I think. Glass and lead I have found the least irritating and most surgeons probably hold the same opinion. I have known a shot to remain imbedded in the retina for twenty years, while the patient preserved good sight, although the eye was irritable under excessive use.

Whether the foreign body is septic or aseptic is the most important point to be considered. Septic foreign bodies as a matter of course are likely to set up inflammation, suppurative or plastic, whereas an septic object will irritate an eye simply on account of its natural quality, like copper, or on account of its presence alone. I think most pieces of metal that fly into the eye are not septic because they usually are the result of an explosion, or a blow produced by one hard body striking on another and either the heat of the explosion or the force of the blow produces enough heat to render the body aseptic. Such is the case particularly with glass when it enters the eye through an explosion. Moreover, glass, on account of its smoothness, is less likely to carry microbes than a rougher material.

The point of entrance of the foreign body is a matter of the utmost importance. Those that enter through the cornea, becoming entangled in the iris, or that fall to the bottom of the anterior chamber, are of least importance and are readily extracted by means of an iridectomy alone or in combination with a magnet. Those that enter the lens and remain there can frequently be extracted by removal of the lens, and if not in that way, in case they are magnetic, by means of a magnet. In my first case, that of the foreign body in the lens, I considered it bad to attempt to remove the lens because the point of the foreign body was projecting into the vitreous and I feared it might remain in the posterior capsule, or if it came away with the lens, might get entangled in the lip of the wound and fall back into the interior of the eye. I think it safe to say that the nearer the foreign body is to the ciliary region, the more likely it is to produce inflammation and destruction of the eye and the more likely it is to produce interference to add to the irritation caused by it.

Foreign bodies suspended in the vitreous, which remain fixed and become encysted, as a rule do not give much trouble, unless with time the vitreous becomes liquid, when they splash about in it and thus disorganize the vitreous and produce general irritation and inflammation. When they enter the retina and remain in the interior of the eye, involving the choroid, they sometimes remain quiet, but it is exceptional and they should always be regarded with suspicion and treated as insidious enemies.

Of course, the degree of the loss of sight in these cases depends on the general condition of the eye, the position of the foreign body with reference to the yellow spot, opacities of the cornea, and the condition of the lens. The prognosis is best in the case of magnetic foreign bodies. Attempts to remove them should always be made with the giant magnet or the hand magnet or both, and the next most important question, and it may be described as a burning one, is the point at which the eye should be attacked by the surgeon. Some surgeons, and I am inclined to think the majority, believe that the bodies should be drawn into the anterior chamber by applying the magnet to the cornea. If the foreign body is behind the lens it will have to make quite a trip to arrive at the anterior chamber. It cannot be pulled through the lens unless it is loosely attached to it, so without a doubt its path is through the ligament of Zinn. It must travel with considerable speed and hence it must cause considerable irritation. In case, however, it is not slender, but is more or less irregular or triangular in shape, it is difficult to pull it into the anterior chamber, and whether the attempt is successful or not, under these circumstances, irritation must be caused. The chance of the eye to recover is in inverse proportion to the irritation caused by manipulation. Hence it would appear best to open the sclera in such cases and so draw the body out through the shortest route possible.

As stated, the nearer the foreign body is to the ciliary region, the greater the irritation and the greater must be the irritation caused by attack. As a corollary, when the foreign body is situated further back toward the rear of the eye the irritation is less. In general terms, however, I think it best to attempt to remove the foreign body through the point of entrance, if that is posterior to the cornea, or by drawing it into the anterior chamber, if it enters through the cornea. The success of this manipulation, that is the removal through the wound of entrance, depends also decidedly on the time when it is attempted. Foreign bodies should be removed in twenty-four to forty-eight hours after the accident, when the chances for success are greatest. The longer the time they remain, the less the chances for success and the greater the danger of the ultimate loss of the eye. The shape of the foreign body should be determined by the *x*-ray before the operator decides on the point of attack. If it is slender it is best to draw it into the anterior chamber because one point will precede the other and the ligament can thus be easily pierced. Sometimes the slender body turns with its long axis at a right angle to the lips of the wound and lodges there. Under such circumstances it is best to manipulate it with forceps so as to make one pole present towards the lips, and then to use the hand magnet.

I think this statement can be laid down as an axiom: *It matters not how fortunate the results may be in any case or how soon after the accident a successful extraction is made, the future of an eye into which a foreign body has penetrated is always problematical.* It is difficult to cite any reliable statistics in this matter and the time has not yet come when they should be made up. In fifteen to twenty years they may be compiled and some definite conclusions drawn, but for the present, the guarded statement just made holds good, I believe.

When a non-magnetic body has passed through the lens and lies anywhere posterior to that structure, the safest thing is to leave it alone. If it happens to be lead or glass, according to my experience the chances for the eye are better than in the case of other substances, but the safety lies in its becoming encysted and remaining fixed in its position. In both my cases of magnetic foreign bodies, attempts to remove them were made after months because there was but little irritation and their position was such as led me to believe they could be extracted with good results. As to the third case, the non-magnetic foreign body, I was convinced when the eye behaved so well and recovered so rapidly that the body consisted of hot lead and that it had passed clean through the eye and lodged in the orbit, but, as seen, it had become encysted in the vitreous and I believe that fact together with the asepsis of the body accounts for the eye remaining quiet. As long as it remains fixed, I believe the eye will be safe, but prophecy is a dangerous thing.

In conclusion, it can be said that the invention of the giant magnet and the perfection of the hand magnet have created an epoch in the surgery of magnetic foreign bodies in the interior of the eye. The surgical management of non-magnetic foreign bodies in the interior of the eye remains approximately what it was before.

To search for a focal infection as the cause of neuritides and obscure arthritides is scientific and therefore commendable; but to rob such patients of their tonsils or teeth without very satisfactory indications is perverting scientific zeal to unscientific enthusiasm.

THE OPERATIVE TREATMENT OF STRABISMUS.*

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The operative treatment of strabismus in children resolves itself, for all practical purposes, into the treatment of the concomitant, or non-paralytic variety, and, in what follows, I shall restrict myself to the consideration of this type.

Paralytic strabismus is exceedingly rare in children for the obvious reason that its most common cause, acquired syphilis, is hardly ever present, and it is only with the utmost rarity that hereditary syphilis produces paralysis of an ocular muscle.

Concomitant or non-paralytic strabismus presents itself under two forms, convergent and divergent, of which the former is by far the more common. In regard to the surgical procedures to be employed for their relief, opinion has differed greatly in the past, and it cannot be said that the subject is definitely settled now. Still, there exists unquestionably more agreement today than there was even fifteen years ago, and the almost invariable operative procedure of the past, tenotomy of the muscle or muscles believed to be in a state of spasm has been to a large extent replaced by, or combined with, operations designed to strengthen the action of the muscles believed to be weakened by disuse.

In the surgical treatment of the convergent variety, we have the choice of one of three operative procedures, tenotomy of one or both interni, advancement of both externi, or the shortening or advancement of the externus of the deviating eye combined with tenotomy of its internus. My own experience, in uncomplicated cases, has been almost entirely restricted to the first and second methods, and in choosing one or the other, I think we should be guided by certain circumstances of the individual case. I think it is true that an advancement of both externi to the corneal margin, in so far as the permanency of the result and the possibility of restoring binocular vision are concerned, is the operation of preference, but a rather extensive experience with its use has convinced me that it may at times be advantageously abandoned in favor of tenotomies. When the squinting eye possesses very little vision, is in a high degree amblyopic, no operative procedure can obtain anything but a cosmetic result, no operation can be relied upon to produce a permanent cure, and it seems to me rather useless to subject the patient to the inconveniences of advancements, or the surgeon to the difficulties of their performance. In such cases, I think a tenotomy of one or both interni just sufficing to under-correct the deviation is, all things considered, the better procedure. The great disadvantage of this method is that gradual divergence will subsequently ensue, but, in the cases mentioned, ultimate divergence will probably follow any method, and if we under-correct the deviation, it is possible to maintain a good cosmetic result for years by the proper employment of glasses.

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* Read before the Section on Pediatrics, New York Academy of Medicine, February 8, 1917.

Again, when the eyes are rather deep set, advancements are difficult to perform, and their cosmetic effect is far from pleasing. After a tenotomy, an eye protrudes slightly; after an advancement, it slightly recedes and, in the cases mentioned, the ultimate result of advancement of both externi is that an expression of cunning is produced, for which even the re-establishment of binocular vision will be found not to compensate the parents, particularly if the patient happens to be a girl. Another disadvantage of advancements is that they leave behind them, for a considerable period, a yellowish discoloration at the site of operation.

When, then, ought we to employ advancements, instead of tenotomies?

In answer to this question, I would reply when the vision of the squinting eye is fairly good, when the eyes are fairly prominent, and when the parents do not object to the patient's confinement to the hospital for a week. In such circumstances, I believe that an advancement of both externi will procure better and more lasting results than any other method. In performing tenotomies of the interni, we must be guided by the amount of effect desired and must so grade our efforts that a slight degree of squint shall remain uncorrected. This is sometimes difficult to do, but, as a rule, such a result can ultimately be obtained. In advancements, our results do not depend upon the degree of deviation present. In all cases, the externi should be advanced to the corneal margin, whether the squint be one of ten, twenty or thirty degrees, and the absence of any fear of an over-correction is a great comfort to the operator.

On the other hand, the technic of a tenotomy is simple, while that of a thorough advancement is complicated. The former can generally be performed, even in children, under cocaine, while the latter, when performed upon both eyes at the same time, always necessitates a general anesthetic. The after-treatment of tenotomies amounts to nothing, while a double advancement requires attention for a week. Nevertheless, advancement of both externi unaccompanied by tenotomies is greatly to be preferred, in my opinion, in suitable cases.

The surgical treatment of divergent strabismus is more complicated than that of the convergent variety and should depend entirely upon the character of the muscular anomaly that is causative. I do not think that this thesis has been sufficiently promulgated. The surgeon who invariably performs one variety of operation upon his cases of divergent strabismus, will meet with an unnecessarily large number of unsatisfactory results. Another point that should be emphasized, although somewhat without the scope of this paper, is that while glasses should always be prescribed in convergent cases, and by their employment cures without resort to operative measures may frequently be accomplished, they are of no curative value whatever in a very large class of those of the divergent type. Cases of divergent strabismus can for the greater part be divided into two great classes, those associated with myopia and those associated with hypermetropia. In the first class, the underlying muscular error is usually an insufficiency of converging power and concave lenses should always be employed before resorting to operation. In the second class, however, the muscular anomaly is almost invariably an excess of diverging power and convex lenses are of no service in aiding in the correction of the deviation.

In regard to operative measures, when the squint is associated with myopia and insufficiency of converging power, advancement of both interni is the proper procedure, and is invariably followed by good results. When the deviation is associated with hypermetropia and an excess of diverging power, a free tenotomy of the externi, repeated if necessary, will be equally successful. In the first class of cases, tenotomies of the externi, and in the second class, advancements of the interni will always result in failure.

It would seem from these statements that the operative treatment of divergent strabismus ought always to be successful, and so I think it is in the two classes described which constitute the greater number of our cases. Unfortunately, there still remains for consideration a group in which the refractive and muscular errors are neither so clearly defined nor so distinctly associated.

Thus we find cases in which one eye is hypermetropic and the other myopic, and others in which the muscular anomaly is a combination of an insufficiency of converging power and an excess of diverging power. In these we cannot so accurately prognosticate the result of our operative measures. When one eye is myopic and the other hypermetropic, the prescription of glasses is usually of no value and, in operating, I think we should always attack first the muscular error that is the more prominent. If we are finally compelled to add a tenotomy to our advancements, or an advancement to our tenotomies, we must expect that we shall sometimes produce an over-effect. A slight over-correction of divergent strabismus is not, however, as disastrous as an over-correction of convergent strabismus, for while a slight convergent squint is hardly discernible, a slight divergent squint is a noticeable deformity.

DIFFICULTIES IN THE DIAGNOSIS OF MONOCULAR OPTIC NEURITIS.

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Every ophthalmologist has been puzzled and worried by the above condition and the advantage of a routine procedure in the investigation has made itself manifest to me after several perplexing situations. It is not within the scope of this paper to endeavor to set forth every possible cause of optic neuritis, but to call attention the more important etiological factors in the production of this pathological entity.

These causes may be divided into three main branches: *constitutional, focal* and *local.*

The *constitutional* conditions are those which are, however, more prone to produce bilateral than unilateral inflammations. Under this head we find syphilis, tuberculosis, nephritis, diabetes and leukemia. Since the discovery of focal infections I believe that rheumatism may be excluded from this group.

The *local* causes predominate in the monocular type. Long before Onodi brought forth his classic work upon the relations of the accessory sinuses to the orbit, Prof. Hirschberg of Berlin impressed upon me the fact that sinusitis was the first thing to suspect after making a diagnosis of unilateral optic neuritis. The ethmoids and sphenoids are more often affected, but I have seen cases where the maxillary and frontals were at fault. This form of accessory sinus disease has been described by so many authors that it is hardly necessary to dwell upon the manner in which the inflammation is carried.

The cerebral variety from meningitis and tumors must be borne in mind.

By *focal* infections I refer to the transmission of toxins or bacteria through the blood current, from a distinct diseased area. Only recently, after failure to relieve a neuritis by other measures, the removal of tonsils caused a rapid improvement. Several investigators have found peridental infections of tooth roots to be another of the prominent sources. Old latent gonorrhea has produced the disease of the nerve, as demonstrated by Reber and his results.

Besides these causative factors, injuries to the orbit with deep cellular inflammation, tumors of the optic nerve and its surrounding area may produce the neuritis.

Now the difficulty in determining the cause is the main trouble in diagnosis, for any ophthalmoscopist will note the pathological lesion; but his responsibility does not end here. I personally endeavor to follow a fixed routine so as not to overlook a possible feature.

Bearing in mind the principle cause, I have roentgenograms made of the sinuses, and also at the same time of the teeth. Of course a careful perimetric test with a campimeter to trace any enlargement of the blind spot is a fixed order. (I need not dwell upon the fact that an enlargement of the Mariotte spot is an early feature of sinus optic neuritis.) If these are negative, a Wasserman test together with a Hecht-Weinberg test and a urinalysis are demanded. This is followed by a complete physical and neurological examination by a competent specialist. In case these proceedings have been unsuccessful, the tonsils are explored for possible pus cavities, and if found, the offending parts are extirpated. A complement fixation test may assist, but of this I am rather doubtful.

And now a last resort in undiscovered causes is to have a rhinologist explore the sphenoids and ethmoids by direct puncture. To demonstrate the efficacy of this I append a rather complete report of an obscure case with a most gratifying result.

F. J. B. was referred to me by an optician on June 7, 1915, because of poor sight in the right eye. The patient was a well-developed, fairly nourished male, 27 years of age. He also complained of a frontal headache on the right side.

Under homatropin cycloplegia his retinoscopy was

$$\frac{+1.0}{+1.9} \qquad \frac{+0.75}{+0.75}$$

V. O. D.+1.0 sph. 6-18—6-12.
V. O. S.+0.75 sph. 6-4.

The right disk was swollen about 2D with indistinct outline; the veins were dilated and somewhat tortuous. The periphery was normal as was the left fundus. Pupillary reaction was perfect. Blind spot enlarged, but test not accurate.

Diagnosis—Optic neuritis O. D.

Examination of the urine was negative.

Referred to Dr. Sidney Lange for a radiogram of sinuses and teeth.

June 9, 1915, Dr. Lange reported as follows:

"The plates of Mr. B. turned out entirely negative. The ethmoids and antra appear fairly clear, although over the right antrum there is increase in density indicating that there has been some thickening of the wall here, probably from a previous infection, but there is no evidence that the right antrum is filled with pus now. The frontal sinuses are quite small and on the right side there is scarcely any frontal sinus to be seen. There seems to be an abortive frontal as a result of anatomical variation. The side view of the skull is negative showing no abnormality about the sella turcica or base of the skull."

V. O. D. 6-60. Disk elevation 3D. Referred to Dr. W. C. Harris for nasal examination, who found:

"The nasal mucous membrane presented a gelatinous appearance, reddish pink in color and uniformly swollen. The turbinate tissue could be only slightly indented by pressure with probe. There was a complete absence of polypoid degeneration, no abnormal secretion. Air cell in left middle turbinated bone considerably dilated. The septum deviated to the right, causing partial stenosis. Posterior rhinoscopic examination shows hypertrophy of lower bone ends. Naso-pharyngeal wall thickened and dry."

The patient was next referred for complete neurological survey to Dr. Wm. Ravine, who reported that everything was negative except a small scar on the penis, possibly from a chancre. Wassermann reaction negative.

June 17, 1915. No longer central fixation. Disk height remains the same, but the vessels more tortuous. Patient has been getting mercury inunctions and KI internally.

July 18, 1915. At my request Dr. Harris opened the ethmoids and sphenoid on the right side and reported as follows:

"Operation. Under cocaine and epinephrin anesthesia the right antrum was first explored but no pus was found. After removal of the right middle turbinated bone a number of small cells and a single large cell were exposed from which pus oozed, foul-smelling and greenish in color. A fine probe introduced high up near the ostium sphenoidale met little or no resistance, and with a crackling noise readily entered the sphenoidal sinus. A curette was then introduced and withdrawn several times, bringing away pus and dead bone. All adjacent cells were then scraped and the opening was enlarged downward and laterally. Wound loosely packed with a strip of gauze and warm sterile vaseline. There was very little bleeding. Patient did not complain of pain during operation, but experienced relief from a severe pressure in head. Ten days after operation nose was free from pus."

July 6, 1915. Vision O. D. 6-36. Disk not elevated and the border shows distinctly upon the nasal side. My next notation is May 29, 1916: Vision 6-12 with faint central scotoma for colors. Temporal half of disk very pale. Sharply outlined. No trace of exudate. Vessels normal.

SPECIFIC EPIPEPHYCITIS (TRACHOMA).

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No apology is offered for anything contained in this paper which may appear hypercritical or in conflict with prevailing ideas expressed in current text-books and elsewhere; nor does an excuse appear necessary for the foregoing superscription to represent the contagious conjunctival disorder hitherto almost universally known and erroneously designated as trachoma, "granulated lids," Egyptian ophthalmia, granular conjunctivitis, and several other equally ambiguous and inexact terms.

It seems a strange commentary that the majority of lexicographers and medical writers have overlooked the following pertinent facts: (a) that literally trachoma can mean only something which is rough, (b) that the term does not, even inferentially, indicate the eye, the conjunctiva, or any other anatomic structure, (c) that the most liberal interpretation of the word conveys not the slightest etiologic nor pathologic hint. Obviously, therefore, trachoma is unscientific, totally inaccurate, a rank misnomer, and should be eliminated from the nomenclature. Granulated lids is incorrect, since the eyelid is not divided into grains. Egyptian ophthalmia is inexact, because: (a) there is no tangible evidence that the disease originated in Egypt, and (b) the word ophthalmia cannot be justified under any circumstances. Oculus or ophthalmus plus infection and inflammation would necessarily be oculitis or ophthalmitis. Granular conjunctivitis appears less objectionable, since it indicates inflammation and definitely locates the anatomic structure implicated, yet it fails to convey the least etiologic indication.

Inasmuch as "epipephycitis" is the correct term to represent conjunctival inflammation,* the designation "specific epipephycitis" seems anatomically, pathologically, technically, and scientifically exact.

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*[Introduced by Achilles Rose.—Ed.]

That the determining etiologic factor of the inflammatory lesions remains unknown, cannot be legitimately imposed as an objection to the term. The disease certainly owes its origin to a specific bacterial agent, although thus far it has eluded isolation.

As is true concerning the majority of other so-called microbic affections, the date and geographic location of the initial appearance of the disease under consideration cannot be definitely stated. There is reason for believing, however, that "contagious sore eyes" are coincidental with the history of mankind. Excellent descriptions of the malady are found in the oldest available medical literature. Contrary to the usual belief that the disease was transported to Europe by the returning army of Napoleon after his invasion of Egypt, it was shown by subsequent investigations that centuries previously "contagious sore eyes" had been endemic in the former country.

The disease has undoubtedly always prevailed in America. There is historical evidence that the aborigines were familiar with its ravages. It is said that of the three hundred and twenty-three thousand Indians remaining, fully sixty-five thousand are infected, the majority of these being in Oklahoma; and that in the same state twenty to forty per cent. of white school children are similarly afflicted. In Kentucky alone it is estimated there are 33,000 cases. Of 18,016 individuals actually examined prior to 1916, seven per cent. were infected. In the remote mountain regions between twelve and twenty-five per cent. of the population suffer from the malady, and during 1915 over twelve thousand cases were treated in five special hospitals in Kentucky, Virginia and West Virginia. The disease also prevails to a greater or less extent in nearly every other state in the union. "Among 192,788 white and colored persons examined to April 30, 1915, there were found 3,619 cases of trachoma; and among 39.231 Indians examined to December 30, 1912, there were 8,940 cases" (Kerr). During seventeen years (1897-1914) inspection of 11,966,897 arriving aliens revealed 22,984 cases of specific epipephycitis. King examined 4,000 children in the Porto Rican schools, finding 9.5 per cent. infected, and classed 5.4 per cent. more as suspicious. He thought the "general average of 9.5 per cent. a fairly accurate index of the amount of infection in the schools throughout the island, which would mean that of an enrollment of 182,766 pupils during the past school year (1914), 17,435 have 'trachoma,' to say nothing of 10,000 more classed as suspicious; truly, a distressing situation!" Clark's estimate is 8.5 in every thousand eye infections; that it is responsible for 18 per cent. of the blindness in Russia; that one thousand cases per year are treated in the Lemberg Hospital; that in Posen and Silesia the disease is very prevalent; that in Japan of 400,000 recruits 23 per cent. were infected; that about 23 per cent. of western Indians and 13 per cent. of those in Virginia have the disease. Only nineteen cases in Negroes were found in a thousand examinations; the Negro has been protected in the past only by his lack of opportunity to contract it (Clark).

As already intimated, notwithstanding the extensive microscopic and bacteriologic investigations which have for years been in progress, the essential etiologic factor of specific epipephycitis remains undiscovered; and while it may seem useless to indulge in purely speculative hypotheses, a brief résumé of existing information may be permissible.

Since the causative agent has thus far defied isolation, certain observers attempt to maintain the obviously fallacious contention that the disease does not owe its origin to a specific contagium, that it simply represents conjunctival reaction "under certain circumstances" to invasion of the bacillus Egyptiacus or other "well-known microorganisms." The "certain cirmumstances" inducing conjunctival reaction in one instance and not in ten thousand others under apparently identical conditions has not been explained. One might with equal propriety disclaim the existence of pathology induced by the ubiquitous diplococcus of Neisser as to deny the specific origin of the disorder under consideration. Other writers contend that specific epipephycitis and folliculosis are identical, the various gradations in virulency being attributable to secondary microbic invasion.

The clinical observation is undisputed that many varieties of bacteria have been isolated from conjunctival excretions during even mild attacks of ordinary so-called non-specific, catarrhal, irritative and follicular conjunctivitis, but it is emphatically denied that the granular or specific type of the disease was ever produced by the invasion of such micro-organisms. Therefore the theory of "etiologic unity" advanced by Axenfeld seems without tangible scientific foundation.

Considerable importance was originally attached to the so-called "inclusion bodies" discovered by Halberstadter and Prowaczek, but since the exact nature of these bodies and their etiologic relationship (if any) remain undetermined, their presence or absence has no practical significance. Moreover, inclusion bodies not dissimilar in any essential respect have been discovered upon normal and abnormal mucosal surfaces in situations anatomically remote from the ocular apparatus, and their presence has been found inconstant even in clinically positive specific cases. This observation is equally applicable to other varieties of so-called inclusion bodies described by Lindner and his coworkers. While successful cultures of these bodies have been made by Noguchi and Cohen, no etiologic importance can be attached to their experimentations inasmuch as the "cultivated bodies" proved non-pathogenic. Whether in nature these inclusion bodies are bacterial, parasitic, or the result of metamorphotic cellular changes, and likewise whether they have a possible etiologic relationship to specific epipephycitis, are still among the unsolved scientific problems.

Present etiologic information may be thus summarized: (a) specific epipephycitis is a contagious disorder, the essential etiologic factor of which has thus far defied isolation; (b) dissemination of the disease is favored by unhygienic and insanitary surroundings among those uneducated in the economic importance of personal cleanliness; (c) common towels, handkerchiefs, etc., are most prolific sources of contagion.

Little need be said concerning the pathology and diagnosis. After inoculation there may be expected conjunctival papillary hypertrophy, irritation and redness, followed by granulation. With the inflammatory hyperplasia there is always increased vascularization. As the lymphoid cells proliferate, the follicles degenerate and usually become encapsulated by connective tissue; hyperplasia and disintegration continue, the capsule ruptures, discharges its contents, and cicatrization occurs. The pathology may thus rapidly or gradually progress until the greater portion of the conjunctiva is destroyed, with obliteration of the blood vessels, atrophy, and formation of cicatricial tissue.

While the disease is classified as acute and chronic, it is usually insidious in its development, the so-called acute stage may escape notice, the pathology being far advanced when the patient is first observed. Bilateral involvement is the rule, but there are many curious exceptions. The disease has been encountered in both extremes of life, and blindness is oftentimes the logical and inevitable result in untreated and neglected cases.

Owing to the similarity between the lesions of specific epipephycitis and folliculosis, differential diagnosis may be difficult without prolonged observation of the patient. However, the tendency of the latter disease is toward resolution, whereas without exception in the former there is rapid or gradual progression. Rapidly developing inflammatory granular lesions may cause intense suffering; conjunctival irritation, lachrymation, photophobia and pain are the most prominent clinical manifestations. In early cases the diagnosis must be based upon these symptoms together with the presence of characteristic "sago-grain" appearance of the conjunctivæ. In the later stages the diagnosis is readily apparent to the initiated.

The most important feature in connection with developed pathology in any anatomic situation is determination of the method by which its removal may be accomplished with least danger to the host. There has been much debate concerning the treatment of so-called trachoma, and many methods of procedure have been devised. As the scope of this paper does not include prophylaxis, extended consideration cannot be accorded that feature. The remark may be permitted, however, that in every instance the disease is preventable by the exercise of proper care.

General medicinal treatment of contagious eye diseases, in so far as the expression may relate to the internal administration of drugs, is a delusion and unworthy of serious consideration. Regardless of the period in the history of the affection when the patient is first observed, remedial measures to be effective must be locally applied, and should be classified as surgical.

The primary therapeutic objects to be remembered are: (a) to minimize conjunctival edema and hypertrophy, (b) to accomplish removal of existing granular lesions, (c) to obviate destruction of the conjunctiva, (d) to prevent complications and sequelæ endangering corneal integrity, (e) to restore normal functionating capacity of the damaged tissues, and (f) to prevent deformity and future visual impairment.

Much of the therapeutic advice given in textbooks seems absurd to present-day ophthalmic surgeons. Inasmuch as the patient, except in rare instances, does not apply for treatment until the disease has already exhibited evidences of chronicity —extensive conjunctival edema with abundant excretion, intense photophobia, pain, etc.—it is the height of folly to temporize with minor local measures which do not contemplate immediate removal of the conjunctival lesions. The mild lotions usually recommended are of value only for their local cleansing and antiseptic effects. It has been my experience that solutions of mercuric bichloride and other drugs as ordinarily applied are harmful rather than beneficial, although the so-called "intense bichloride rub" may sometimes be advantageously employed. This method is strongly advocated by Beals, who says "one of the most pleasing features of this treatment is that no scar tissue results." The technical details of his procedure will be described later. The local employment of caustics and ointments, such as copper sulphate, silver nitrate, copper citrate, tannic glyceride, alum, zinc, mercury, etc., has for the most part been found unsuccessful, although some of these agents may be distinctly useful in lessening excretion and promoting healing after surgical destruction of the granular conjunctival tissue has been accomplished.

It is my opinion that conservative surgical operations, such as digital or instrumental expression of the granular masses, grattage, curettement, scarification, or combinations of these procedures, should be given preference over more radical methods. The plan best suited to the individual case can be determined only by careful examination.

Thorough expression by means of the thumb and forefinger under local anesthesia has been found an admirable method of treatment, or if preferred the roller forceps of Knapp, the expressor of Kuhnt, the oval forceps of Noyes, or other suitable instrument may be used.

Incision followed by grattage is believed by many operators to be a more rational surgical procedure than simple expression as ordinarily employed, since the granulations and underlying lymphoid tissue may be thereby more thoroughly destroyed and cure hastened. This operation should be performed under general anesthesia, and the globe must be properly protected to prevent its being injured during the "scrubbing" process. A sufficient number of conjunctival incisions (about 2 mm. apart) are made with a sharp scalpel at right angles to the lid margin, after which the tissues are "scrubbed" with a stiff brush or the gauze-covered finger of the operator, until the surface becomes comparatively smooth.

Removal of the granulations and hypertrophied tissue by means of a small sharp curette under general anesthesia may be sucessfully accomplished, but as the procedure entails greater danger than expression or incision and grattage, in my judgment the latter operations are to be preferred. Curettement can be no more effective than grattage, the technic is difficult, the operation is tedious, and the danger of inflicting serious injury to blood vessels infinitely greater.

Light scarification followed by either digital or instrumental expression is popular with certain operators. It is claimed that the method is superior to incision and grattage, because the danger of damage to the underlying healthy tissue is minimized. It is more effective than expression without scarification, because of the facility with which the granulations are removed. The technic is simple, but a general anesthetic is necessary for its satisfactory completion. I believe this is one of the most effective methods of treatment yet devised, and in the majority of instances should be the operation of choice.

Beals' "intensive bichloride rub" may be executed under local anesthesia, and his technic is briefly as follows: Instil one drop of a ten per cent. solution cocaine into the eye, three times, at five-minute intervals, then wait for fifteen minutes. Use a cotton applicator of steel with large wooden handle, the shaft being three-sided to facilitate twisting the cotton pledget into a hard roll the diameter of which should be the size of an ordinary lead pencil. The cotton pledget should extend well beyond the round and smooth end of the shaft. The cotton is dipped in 1-1,000 mercuric bichloride solution. The patient sits in front of the operator with the head tilted backward, is directed to look toward the cheek, and to keep the eyelids relaxed. With the left hand gently grasp the upper eyelashes and raise the lid from the globe; with the right hand pass the cotton pledget underneath the lid; release the lashes and, grasping the handle of the instrument with the right hand, pass the cotton slowly but firmly from side to side; at the same time putting the lid gently on the stretch by lifting the probe away from the globe. As the probe passes from side to side it is rotated, especially at the inner and outer angles. The patient is directed to turn the eye upward and a similar procedure is pursued with the lower lid.

Destruction of the implicated tissues by means of the galvano-cautery is merely mentioned to suggest its inapplicability. During the period when electricity was recommended and extensively utilized in the treatment of various internal and external lesions, this method enjoyed some popularity. So far as can be ascertained, it has now been practically abandoned.

Radical excision of the tarsal cartilage and palpebral conjunctiva according to the technic originally suggested by Heisrath and Kuhnt, or some modification thereof, is now being quite generally employed. For instance, in a recent article White and White refer to over four hundred patients treated according to this plan. "The efficacy of this operation seems to be known to but few. Radical removal of the pathological tissue is unconvincing to many men, but when an apparently hopeless case of blindness of long standing grows worse under every other form of treatment, and immediate improvement is noted after this operation so that soon the patient is able to earn a livelihood, it seems as though everyone must be convinced" (White and White).

Although in my private practice such radical surgery has been found unnecessary in the treatment of this affection, my results having been satisfactory from less heroic measures, it is well understood that circumstances might arise making radical excison of the cartilage and conjunctiva advisable. For instance, in aggravated long-standing cases with great lid deformity the excision operaation has a distinct field of usefulness. During my service in one of the large ophthalmic hospitals of New York several patients were subjected to this procedure with satisfactory results.

The following excerpt of White's technic is presented merely as a matter of surgical interest: After proper preparation of the patient the lid is everted and the margin grasped by fixation forceps and incised. The method of incision is important, as failure of correct placing may mean post-operative deformity. One should begin in the center and extend the incision with sharp scalpel through the subareolar tissue. A mattress suture is placed in the center of the ocular conjunctiva and dissection continued until the outer and inner canthi are reached. Dissection at the outer and inner canthi should be left until the last, as bleeding from arteries at these points may be profuse. Hemorrhage is controlled by hot compresses, mosquito hemostats, and adrenalin. After introducing mattress sutures at the outer and inner canthi the cartilage is excised. A wide thin rubber horn introduced between the conjunctival flap and the posterior surface of the tarsal cartilage protects the globe. Excison is commenced with scalpel and completed with curved scissors, the muscle and tissue being dissected from the inner surface, and the cartilage removed in its entirety. Proper placing of the sutures is an important step. The first suture is inserted in the center through the transverse fold; the second thread of the double suture is then passed through the strip of cartilage left at the peripheral margin of the lid at the same vertical point as the first. Other sutures as required are placed in like manner. The sutures are tied over sanitary cigarette drains extending from inner to outer canthus, or upon rolled cotton asepticized with ten per cent. argyrol solution. The stitches are removed the third day, or sooner if necessary, and the external lid surface dusted with sterile powder (White).

One of the most important indications in post-operative management is the application of ice-bags. In some instances hot compresses seem more effective in reducing pain and promoting comfort. In either event the applications must be changed with sufficient frequency to maintain a fairly even degree of cold or heat. Irrigations are contraindicated excepting to remove the debris immediately following the operative procedure. Ointments containing copper, mercury or other suitable drug may be gently applied as required to lessen excretion and promote healing. Applications of heat and cold may be discontinued after twenty-four hours unless pain continues severe.

This paper would be incomplete without mention of the two latest therapeutic measures that have been advised in the treatment of so-called trachoma, although I have had no personal experience with either, viz., vaccine and radiotherapy. In a recent article Lowenstein and Hermann claim to have been experimenting with such vaccine therapy for ten years. A portion of their paper is quoted for what it may be worth: "Only the crude disease product could be used for the production of antigens. Cases were selected which presented 'trachoma granules.' These were expressed, the instrument cleansed, and the granules 'rubbed up' in a mortar with saline infusion and injected, without further elaboration, beneath the skin. No reaction followed, not even allergy. Eight or ten days after injection the disease began to improve, and in three weeks more the lesions had cicatrized. In certain cases 'trachomatous' pannus, when present, disappeared and the cornea 'cleared up.' The return of vision was remarkable."

Writing on the "radiotherapy of trachoma," Rossler states that for some time he has been applying the Finsen method of treatment to "trachomatous eyes," incited thereto by Groenholm's report of unusual success with this method. The author states that seventeen or twenty-one cases thus "finsenized" were cured or materially improved, and in only four did the affection continue a progressive course. The mild uncomplicated cases were the ones most benefited. Rossler claims that "he never witnessed such prompt and permanent cures under any other measures."

The foregoing citations from recent literature emphasize the fact, well-known to ophthalmic surgeons, that while no single method of procedure yet devised has proven entirely satisfactory in the treatment of specific epipephycitis, the disease is curable with preservation of visual function in practically every case provided the patient be seen sufficiently early. However, where the disease has been permitted to progress unchecked and blindness has already ensued from corneal implication, there is no method known by which vision may be restored. Even in such cases, however, it may be possible to promote physical comfort of the patient by surgical correction of existing deformities.

To describe in detail the various complications and deforming sequelæ, and discuss the methods of treatment applicable to each, would prolong this paper beyond reasonable limits.

REFERENCES.

Beals: New York Medical Journal, November 13, 1915.
Clark: Journal of the A. M. A., December 5, 1914.
Editorial: Journal of the A. M. A., March 20, 1915.
Editorial: New York Medical Journal, January 9, 1915.
Kerr: Journal of the A. M. A., September 18, 1915.
Lowenstein-Hermann: Quoted in Medical Record, October 23, 1915.
Posey: Sajous' Analytic Cyclopedia, 1913.
Ray: Louisville Month. J. of M. & S., May, 1915.
Rebuck: Penna. Medical Journal, May, 1916.
Rossler: Quoted in Journal of the A. M. A., January 24, 1914.
Schwartz: Journal of Tropical Diseases, July, 1914.
White-White: Ophthalmology, October, 1915.
White: New York Medical Journal, April 29, 1916.
Williams: Journal of Infectious Diseases, March, 1914.
Wright: International Clinics, October, 1915.

THE SELECTION OF SURGEONS BY THE HOSPITAL.

In the selection of a surgeon, trustees may be unduly impressed by popularity. A surgeon rarely acquires a large clientele unless he is competent to operate, but the most popular surgeon is not always entitled to hospital preferment. A surgeon whose private practice is so large as to exhaust his time and energy cannot be expected to be punctual in attendance on the wards, or to be deliberate, careful and thorough in examining ward patients. This is the type of surgeon who sees his patient for the first time in the operating room, and who is content to leave diagnosis and other preliminaries in the hands of the house staff. Such a surgeon may be entirely willing to give his best service to the hospital, but he is not in a position to do so. The function of the hospital is a dual one—first, to care for its patients, and, secondly, to contribute to the advancement of medicine. No hospital may rightly neglect either of these functions. A surgeon who is so preoccupied by private practice that he cannot interest himself in research work, cannot train his assistants, and cannot cooperate freely with the laboratory staff, is one whom the hospital can afford to pass by.—S. S. GOLDWATER, in *The Modern Hospital.*

In cases of unaccountable fever, especially in children, never fail to examine the ear.

A PIECE OF LEAD PENCIL IN THE ORBIT ONE YEAR: A CASE REPORT.*

JOSEPH BRUDER, M.D.,
NEW YORK CITY.

H. G., aged six years, was brought to my office on the 28th day of December, 1916, with the following history:

He fell on his face one year ago, causing redness and swelling of the right upper lid and the right globe; the mother also noticed that there was a slight drooping of the lid.

The family physician treated the boy for a period of about six months, at the end of which time he incised the so-called swelling, stating that an abscess had formed. The swelling persisted, however, and the wound refused to heal. The mother then took the child to several other physicians, who also incised the wound, but without success.

When seen by me, there was a swelling at the upper and inner margin of the orbit, the size of a hazel-nut, which had an appearance not unlike that of a sebaceous-cyst; there was also slight divergence of the right eye.

I made a tentative diagnosis of a foreign body in the orbit.

The following morning, under general anesthesia, I cut down into the abscess, and with a probe I detected a foreign body, which proved to be a piece of lead pencil, about three-quarters of an inch in length, imbedded obliquely in the antero-posterior diameter of the orbit.

Within a few days after the removal of the pencil, the swelling disappeared and the wound healed.

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* Presented before the Ophthalmological Section of the New York Academy of Medicine, January 15, 1917.

THE NEW OPHTHALMOLOGICAL SERVICE AT BELLEVUE HOSPITAL.

A unique ophthalmic service of fifty beds has just been opened in Bellevue Hospital, New York. It is located in the new surgical pavilion, but is a separate unit, with its own attending and resident staffs, nurses, operating, examining and dressing rooms. Dr. Charles H. May is director of the service and Drs. Julius Wolff and John M. Wheeler are his principal assistants.

The parotid lymph glands are not uncommonly the seat of tuberculous infection, and when there are no cervical node involvements to suggest the diagnosis the chronic swelling is often mistaken for a parotid tumor.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, MARCH, 1917.

THE SIGNIFICANCE OF COUGH OF SUDDEN ONSET.

It is an accepted and deplorable fact that physicians are leaning more and more on the crutch of laboratory findings and losing or, which amounts to the same thing, not using their clinical sense. With the disinclination to use and to sharpen their powers of observation comes the neglect of careful histories. Without any spirit of harsh criticism we would mention this matter in order to point out that there are in every physician's experience instances where a careful history taken when the patient first came under observation might have avoided a fatal termination.

In this connection attention is called to the onset of cough, especially a sudden onset in an individual previously well. Within the past six months there have come under our observation and notice several cases of foreign bodies in the air passages and in the esophagus in which the parents—because these patients are almost invariably children, and children often too young to be questioned—gave no more information than that the child was ill with a cough. The diagnoses were made in each of these cases by a careful and painstaking history.

In every child the sudden onset of cough is a symptom of deepest significance. In some instances the parent will know the moment that the first paroxym began. Usually, in foreign body cases, there is a sudden paroxysm, often with dyspnea and cyanosis which after a few moments passes off. This may be followed at shorter or longer intervals by other paroxysms or there may be further cough of slight or marked severity but not paroxysmal. The cough is often relieved by the patient's lying down, perhaps in one certain position. Any movement or change in position may bring on a return of the coughing. There is no fever or expectoration, at least at first, and there may be no physical signs of lung involvement. The parent may volunteer the information that the child was eating at the time of the first paroxysm. A history such as this can often be elicited by a little questioning and then the diagnosis is plain. Roentgenography is of very little value, for unfortunately very many of the foreign bodies inhaled in this way do not cast shadows. A shadow, however, clinches the diagnosis and a roentgen examination should always be made, for it will serve to definitely locate a certain number of foreign bodies. A negative picture makes an early bronchoscopic examination all the more imperative, for food particles disintegrate in the bronchus and then are extremely difficult to remove in their entirety.

The consequences of retained foreign bodies of soft consistency are very serious. Pneumonia follows, as a rule, and chronic fibrous processes may be set up, or the breaking down of lung tissue and abscess, formation, or dilatation of the bronchi and bronchiectatic cavitation may ensue.

A history of this sort is pathognomonic. Yet in a recent case three different medical men ignored these facts as of no consequence and so impressed the parents that a fourth doctor who was called because the child was growing worse was not told this history. He was unable to make a diagnosis on the physical findings and asked for a consultation. The pediatrist, an experienced and able man, by careful questioning again elicited the history of cough of sudden onset and bronchoscopy removed the foreign body, a piece of nut, after an interval of three weeks. This child died of bronchopneumonia.

Another recent instance was that of a metallic foreign body—a collar button—which perforated the esophagus after having been lodged therein for over four weeks. This child had been taken to the pediatric clinic of one of our hospitals. Despite careful questioning, the mother denied the possibility of a foreign body's presence. Four weeks later there was a massive hemorrhage from the mouth and the fluoroscope revealed the collar button. The child was in extremis when admitted to the hospital and died with the button unremoved.

Valuable time is lost and comparatively simple conditions with practically no mortality turned into indubitably fatal ones by neglect of these niceties of observation. When patients with unaccountable cough—with or without dyspnea and expectoration and with few or unexplainable physical signs are submitted to early bronchoscopy—which in expert hands is harmless—deaths from foreign bodies in the air passages will be reduced to a minimum. —L. G. KAEMPFER.

Surgical Suggestions

A suction device to keep the air passages clear of blood is of the greatest importance in all operations under general anesthesia within the mouth or pharynx. Its employment will obviate aspiration pneumonia and pulmonary abscess.

A careful examination of the ears, the teeth and the accessory sinuses of the nose may reveal the cause of a long-standing trifacial neuralgia.

The practice of performing tonsillectomy, adenoidectomy and submucous resection of the nasal septum in the office, is a risky one and should be condemned. These are not trifling procedures, they are not free from danger; and the patient is entitled to the proper environment for their performance and after-care.

Intermittent swelling of the submaxillary (salivary) or parotid gland, usually with discomfort when eating, is very suggestive of a stone in Wharton's or Steno's duct. Stricture of Stenos' duct will produce the same symptoms, (i. e., a simple stenos-is) without stone.

Frontal sinusitis, with pain, tenderness, fever and even slight swelling for several days may yet recover without operation; on the other hand, frontal sinusitis too long neglected may develop osteomyelitis of the frontal bone or brain abscess.

Pediculosis capitis with pain, tenderness and swelling of the mastoid region has often been mistaken for mastoiditis; so has a furuncle in the auditory canal.

It is in the aged individual, with healthy children and grandchildren, who apparently has never had evidences of syphilis, that one is most apt to be led astray by some late manifestation of the disease.

Book Reviews

Diseases of Occupation and Vocational Hygiene. Edited by GEORGE M. KOBER, M. D., L. L. D., Washington, D. C., and WILLIAM C. HANSON, M. D., Belmont, Mass. Large octavo; 875 pages; illustrated. Philadelphia; P. BLAKISTON'S SON & Co., 1916. Price $8.00.

Books upon occupational diseases are by no means scarce, but there is at present no single volume dealing so fully and authoritatively with occupational diseases and vocational hygiene as this new volume produced under the editorship of Kober and Hanson. The contributing editors, with the exception of three, are all American, whose personal interest in the subject and public service have made them competent authorities to discuss the particular themes appearing under their names.

The general content of the book covers: Part 1,, Specific and Systemic Diseases of Occupation, Fatigue, and Neuroses; Part 2, Etiology and Prophylaxis of Occupational Diseases and Vocational Hygiene; Part 3, The Relation of Clinics, Statistics, Governmental Study and Legislation to Occupational Diseases.

The subject matter under these three heads are variously diversified and no single author is responsible for the elaboration of the text for more than a few chapters. In the writing of the volume there have participated physicians, teachers, legislators, legal experts, insurance examiners, statisticians, clinicians,, physiologists, sociologists, and public health officials. The points of view thus diversified contribute to the superior value of this work as a source of information for employers labor organizations, physicians, legislators, and public health officials.

The general scope of the subject has been so thoroughly covered that the book merits consideration and study by those seeking or needing a convenient and authoritative guide to study ooccupational diseases and vocational hygiene.

Preventive Medicine and Hygiene. By MILTON J. ROSENAU, Professor of Preventive Medicine and Hygiene, Harvard University; Director of the School for Health Officers of Harvard University and the Massachusetts Institute of Technology. With Chapters upon Sewage and Garbage, by GEORGE C. WHIPPLE, Professor of Sanitary Engineering, Harvard University; Vital Statistics, by JOHN W. TRASK, Assistant Surgeon-General, U. S. Public Health Service; MENTAL HYGIENE, by THOMAS W. SALMON, Medical Director, National Committee for Mental Hygiene. *Second Edition,* Thoroughly Revised. Large octavo; 1209 +76 pages. New York and London: D. APPLETON & Co., 1916.

The rapid strides made in advancing the science of preventive medicine and hygiene have called forth a second edition of Rosenau's excellent treatise. The broad field of science forming the foundation of public health work has been greatly enriched by the addition of much new material. Numerous new subjects have been added. Many chapters have been rewritten, and one section on Military Hygiene has been added, while the chapter dealing with Mental Diseases has been recast and widened in scope under the general title Mental Hygiene.

It is unnecessary to review the various sections on the Prevention of the Communicable Diseases, Immunity, Heredity and Eugenics, Foods, Soil, Water, Sewage Disposal, Refuse Disposal, Vital Statistics, Industrial Hygiene and Diseases of Occupation, Schools, Disinfection, and Military Hygiene. It is sufficient to say that it represents the most useful single volume accessible to students of medicine or public health.

The general text-book form has not been altered, so that moot discussions do not fill up unnecessary space. The references at the conclusion of each section suffice to indicate the authorities consulted in the development of the text, and afford an opportunity for those, particularly interested in definite subjects, to continue their researches in books specifically devoted to such subjects.

The text, printing and illustrations, diagrams, and charts reflect unusual credit upon the author and publisher.

Progress in Surgery

A Résumé of Recent Literature.

Anatomic Relations of the Cavernous Sinus to Other Structures, with Consideration of Various Pathologic Processes by Which It May Become Involved.

Henry Glover Langworthy, Dubuque, Iowa. *Annals of Otology, Rhinology and Laryngology*, September, 1916.

Langworthy describes the anatomy of the cavernous sinus and its relations to the neighboring structures and collects "the scattered data of pathologic affections available in the literature of the past fifteen years, together with information from question letters sent to prominent general surgeons throughout the country."

He has classified the pathological conditions affecting the sinus under the following heads: (1) septic thrombosis, (2) gun shot wounds, (3) involvement from fracture of the skull, (4) arteriovenous aneurism, (5) operative injury, (6) malignant growths, (7) congenital affections, (8) aseptic thrombus, (9) intermittent exophthalmos.

Septic thrombus is the most important of the conditions and the one most often encountered, tho its incidence is so rare that two or three cases is all that the average man will see in a lifetime. Its prognosis is bad. Altho in the more recent literature there are seven per cent of recoveries we can, in individual cases look only for an unfavorable outcome.

The author proposes an operation by the nasal route. The middle turbinate is removed and the ethmoid and sphenoid sinuses exenterated. The roof of the sphenoid is then broken thru and the opening enlarged by means of a currette of special construction. Then the sinus can be attacked. There is no danger to be feared from injury to the carotid.

An Epidemic of a Severe Form of Acute Infection of the Throat, with Abscess Formation—Report of Fifty-eight Operations.

Clement F. Theisen, Albany, N. Y. *Annals of Otology, Rhinology and Laryngology*, September, 1916.

An epidemic of virulent, acute infection of the throat occurred in Albany and its environs: 384 cases were observed of which fifty-eight required surgical intervention. Forty-four were peritonsillar abscess, six bilateral; eight were abscess of the lateral columns of the pharynx and there were two each in the epiglottis, the lingual tonsils and retropharyngeal region. In these cases the tonsils appeared to be well.

Quoting Semon he states that all varieties of septic sore throat are essentially the same pathologically, differing only in the virulence of the infection. Cultures showed streptococcus as the infecting organism.

The patients were all very ill. The abscess cases started acutely and developed rapidly with adenitis and great edema extending in two cases into the larynx. Arthritis occurred in eight cases and endocarditis in one. Otitis was a frequent complication in cases both with and without abscess.

In some of the cases the upper poles of the tonsils were resected for drainage of the abscess and the author advocates tonsillectomy in the acute stage for the treatment of peritonsillar abscess in selected cases.

In thirty cases in which milk was examined the infection was traced to the same dairy. On the use of pasteurized milk the epidemic subsided.

Esophagotracheal Fistula.

Robert Levy, Denver. *Annals of Otology, Rhinology and Laryngology*, September, 1916.

Levy reports a case in a woman, aged 24, who had had asthma and bronchitis for a year. There was no history of syphilis. Wassermann test was not made. There was almost continuous cough and expectoration and a loss of weight amounting to thirty-five pounds.

Six days before examination there was difficulty in swallowing food. A diagnosis of laryngeal tuberculosis was made, but was not confirmed by examination. Violent coughing was induced by attempts at swallowing. An X-ray after a bismuth meal revealed a communication between the trachea and the esophagus. Death followed in twelve days.

Autopsy showed numerous scars on the tracheal mucous membrane and a perforation into the esophagus about two centimetres above the bifurcation. There was bronchopneumonia and several small pulmonary abscesses. Levy thinks that despite the absence of history syphilis was the underlying cause of the perforation.

Quoting the literature he finds that the chief causes of these perforations are, in their order of frequency, carcinoma, tuberculosis and syphilis. A few are traumatic due to the lodgment and ulceration of impacted foreign bodies and in some the cause cannot be determined.

The Diagnosis and Management of Vasomotor Disturbances of the Upper Air Passages.

J. L. Goodale, Boston. *Annals of Otology, Rhinology and Laryngology*, September, 1916.

The disturbances are dependent upon the entrance of foreign proteids into the system. This may be either by inhalation or by ingestion. Foreign proteids may develop upon the mucous membranes by autolysis of bacteria. In this connection the author points out the possibilities of chronic sinusitis and of chronic tonsillitis as factors.

Material for making skin reactions is prepared from the keratin and sera of domestic animals, from pollen and from various articles of food both raw and cooked.

The management of the cases depends upon the reactions in relation to the clinical history. Those due to pollen can be immunized by injections of pollen extract. Patients susceptible to proteids of animal origin should avoid the causes rather than seek immunization.

Disturbances of bacterial origin suggest the removal of foci that can cause the retention of bacterial products.

Adenoma of the Palate.

Gordon B. New, Rochester, Minn. *Annals of Otology, Rhinology and Laryngology*, September, 1916.

Neoplasms of the palate are usually carcinomata. They arise either in the palate or extend from neighboriing structures. Adenomata are very rare. Paget in 1886 reported thirty-one cases. Since that time New has been able to collect only eight cases with a pathological diagnosis and five reported as adenomata but without microscopicial diagnosis.

The age of the patients ranged from sixteen to sixty-five. There are no symptoms except those due to the size of the tumor. The tumors are encapsulated and covered by normal mucous membrane. They are embryonic in character. New reports two cases.

Report of the Removal of a Fragment of Tracheotomy Tube from the Lung, Six Years After its Inspiration.

Francis R. Packard, Philadelphia. *The Laryngoscope*, December, 1916.

Twelve years before Packard saw this patient he was in the Pennsylvania Hospital with an abductor paralysis for which he wore an intubation tube for two months. A month after his discharge from the hospital he returned with an attack of dyspepsia for the relief of which tracheotomy was performed. He left the hospital six months later wearing the tracheotomy tube.

Six years ago he coughed out his tracheotomy tube, which he had not removed for any purpose during the three previous years, and found that a piece of it was missing. Since that time he has suffered from violent attacks of coughing, with pain in the chest and occasional bloody expectoration. In April, 1915, a roentgenogram revealed the presence of a foreign body in the right bronchus. He refused operation. In July, 1915, it was in the same position. Under ether anesthesia the piece of tracheotomy tube was extracted from the bronchus. The author notes that the man was wearing an obturator in his tracheotomy tube, but he refused to permit the closure of the tracheotomy wound. Despite the length of the residence of the foreign body in the bronchus the patient made a complete and uneventful recovery.

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A NEW PROCEDURE FOR SUSPENSION OF THE PELVIC COLON.

J. H. KELLOGG, M.D., L.L.D., F.A.C.S.
BATTLE CREEK, MICH.

Roentgenological studies made in several thousand cases of chronic constipation by Dr. James T. Case, have clearly demonstrated that in by far the great majority of cases of obstinate constipation the cause is largely a mechanical one and is located in the distal portion of the colon, generally in that portion of the sigmoid flexure of the colon which is termed by modern anatomists "the pelvic colon."

More than a hundred years ago, O'Bierne of Dublin, showed by careful experimentation that the pelvic colon plays an important part in the function of defecation. The observations of O'Bierne, while long ignored, have in recent times been confirmed by roentgenological observations. When empty after complete bowel movement, the pelvic colon falls in a collapsed state into the iliac fossa or drops back into the pelvic cavity. As the pelvic loop of the colon is gradually refilled it rises out of the pelvis and when it is fully distended a portion of its contents is pushed on into the rectum. The distention of the rectum with fecal matter gives rise to the "call" and the reflexes which aided by voluntary effort result in the discharge of the bowel contents.

It is evident, then, that a prerequisite for normal bowel action is great freedom of movement for the pelvic colon. It is for this reason that the pelvic colon is provided with a mesentery. When prolapsed, a fold is formed at the pelvi-rectal junction which acts as a valve and which hinders the advance of the fecal mass, thus becoming a very definite mechanical obstacle to normal bowel movement. Under normal conditions the filling of the pelvic colon lifts it out of the pelvis and so unfolds the gut and opens the pelvi-rectal junction; but unfortunately this normal action is frequently interfered with. When by a too concentrated diet, sedentary habits of life, and especially by neglect to respond promptly to the "call" of Nature for bowel evacuation, the pelvic colon is allowed to be habitually overfilled, it is gradually stretched and elongated, its muscular walls become thin and flaccid by over-stretching and atrophy and as a result the pelvic loop when emptied falls in a crumpled mass into the pelvic cavity and easily becomes incarcerated so that it does not fill and rise in the normal way. Defecation now is only possible when the accumulation in the descending colon becomes so great that the fecal matters are forced through the narrowed and folded gut into the rectum by the accumulated pressure behind. The stool instead of being normally formed consists of round hard masses of scybala resembling the feces of a sheep.

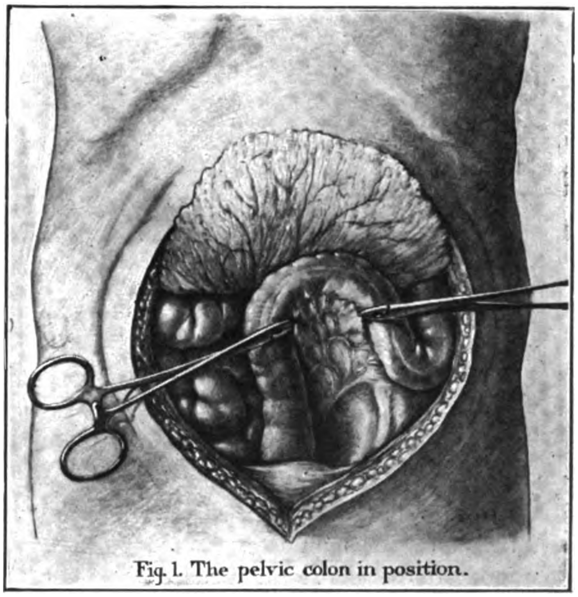

Fig. 1. The pelvic colon in position.

As a natural consequence of the chronic stasis of fecal matters in the pelvic colon the mucous membrane of the gut becomes infected, a condition of chronic colitis is established which produces a spastic state of the bowel and increases the stasis and in the meantime may involve the entire thickness of the wall of the gut, thus giving rise to pericolitis and adhesions of the gut to the surface with which it lies in contact. I have noted in cases of this sort adhesions of the gut to the brim of the pelvis, the left Fallopian tube, the left broad ligament, the left ovary, the uterus and to its own mesentery. Adhesions may be located at the middle of the pelvic loop or at one or both ends, or may involve the entire pelvic colon.

In the beginning the mechanical obstruction to defecation induced by ptosis of the pelvic colon may be temporary, owing to the fact that the loop of bowel may now and then rise from its prolapsed position so that the patient may for a time experience entire relief. After a while, as the bowel becomes stretched more and more, the incarceration becomes complete so that it no longer rises but remains constantly in a prolapsed and crumpled condition, affording favorable opportunity for the development of peri-colitis and adhesions.

As the result of the fixation of the gut, still another pathological condition develops. As the colon cannot clear itself in the usual manner by the mass movement of the pelvic loop, such as normally occurs, there develops an exaggerated form of another mode of peristalsis in which strong constriction waves pass along the gut molding the feces into nummular masses that are slowly one by one pushed along into the rectum. I have, on numerous occasions, watched this action of the bowel through a proctoscope. The effect of this exaggerated peristalsis acting upon an adherent and narrowed gut is to cause stretching and relaxation of the wall of the intestine at the point of attachment and ultimately to produce invagination of the gut. This is most likely to occur near the pelvi-rectal junction, but the relaxation may involve the whole upper part of the rectum. I have in several instances seen through a proctoscope the gut behave in the manner described. I think it possible also that invagination of the pelvic colon into the upper part of the rectum may occur as a result of great redundancy of the pelvic colon and relaxed and thickened condition of the rectal mucosa.

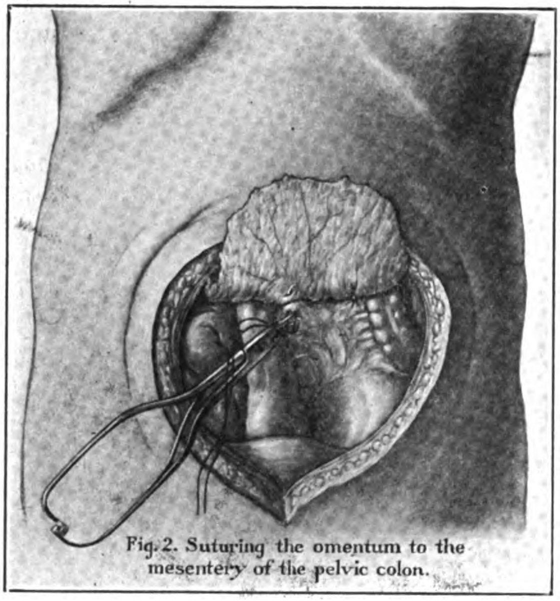
Fig. 2. Suturing the omentum to the mesentery of the pelvic colon.

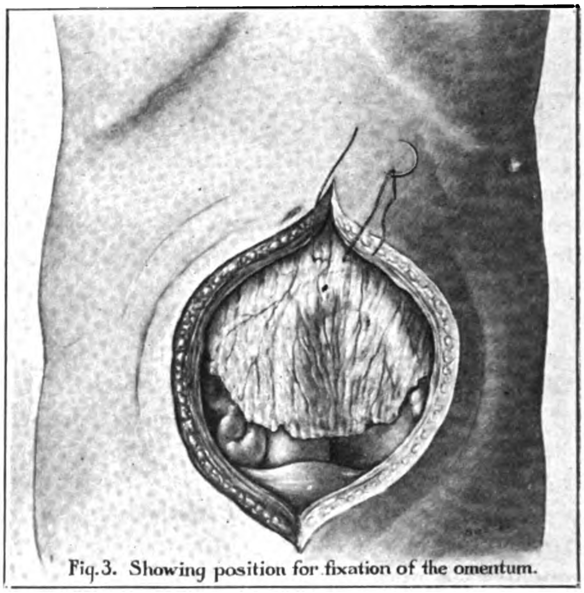
Fig. 3. Showing position for fixation of the omentum.

There are then three distinct pathological conditions connected with ptosis of the pelvic colon:

1. Temporary or permanent incarceration of the gut without adhesions.
2. Prolapse and adhesion of the pelvic loop.
3. Prolapse of redundant pelvic colon with invagination.

In seeking for means of relief for the constipation resulting from ptosis of the pelvic colon, I have found that regular bowel movements may in many cases be secured by the administration of sufficiently large doses of paraffin oil combined with agar-agar of wheat bran in some form. Not infrequently one or two tablespoonfuls of bran at each meal, with an ounce of paraffin oil, will afford entire relief from the chronic constipation resulting from the mechanical hindrance to colon action.

Not infrequently in dealing with cases of the first class in which the prolapsed bowel has not yet become adherent, relief may be obtained by means of massage with the patient placed in the knee-chest position. It seems to be possible by very deep digital kneading to lift the prolapsed gut out of the pelvis and thus secure normal bowel action. If while this procedure is being practiced daily, the patient is made to take on a considerable quantity of flesh, the increase of the intra-abdominal fat especially in the mesentery and appendices epiploical of the pelvic colon may sometimes aid in making the relief permanent, by decreasing the liability of the bowel to incarceration in the pelvis.

In cases, however, in which the bowel is extensively adherent or is adherent in such a way as to produce very marked narrowing of the lumen of the gut, and in cases in which the obstruction is due to invagination of the gut, no definite or permanent relief can be obtained except by a surgical procedure. Adhesions must be broken up and the bowel lifted into place. With the abdomen open and the pelvic colon in view, it is not difficult to release the adherent part; but if no efficient preventive measures are adopted, the loop of gut will quickly fall back into the old position, adhesions will re-form and the condition of the patient will be in no way improved.

Operative Technic.

In connection with observations upon cases of incompetency of the ileocecal valve, Dr. Case noted that with this condition was frequently associated prolapse and adhesions of the pelvic colon. Evidently no benefit could be expected from an operation to repair the ileocecal valve so long as the cause of this condition was not removed. After careful study of a number of cases of this sort, I devised a method of suspending the pelvic colon which it is the chief purpose of this paper to describe.

Several operators have sought to maintain the pelvic colon in position by attaching it to the abdominal parietes. In the single case in which I adopted this procedure a number of years ago, the patient suffered so much pain as a result that I have since been unwilling to repeat the operation. The parietal peritoneum is highly sensitive and the continued irritation caused by the struggles of an adherent gut to free itself may become a source of great distress. My procedure, as will be seen by the accompanying description, avoids this difficulty by attaching the loop of the colon to the under side of the omentum, then attaching the omentum at a point higher up to the parietal peritoneum. This method gives the gut a swinging attachment and, as I have demonstrated in a considerable number of operative cases, is not accompanied by painful sensations during the active movements of the colon which occur during defecation.

The technic of the operation will be so readily understood from the accompanying cuts that only a brief description is required. First of all it is important to be assured by a thoroughgoing roentgenological examination by a competent roentgenologist that the pelvic colon is both prolapsed and adherent. This condition when present may be almost certainly recognized in all cases except in persons who are excessively fat. In operating upon a considerable number of patients in whom a diagnosis of adhesion of the pelvic colon has been made in connection with other findings, I have very rarely indeed found the roentgenologist to be in error.

For two or three days before the operation the patient takes liberal doses of paraffin oil, an ounce and one-half or two ounces, three times a day. An enema is administered the morning of the day of operation. The patient is shaved and otherwise made ready for a laparotomy.

Just before the operation the patient is placed in the knee chest position and with the aid of the proctoscope a stomach tube is introduced as high up in the pelvic colon as possible. The purpose of the tube is to prevent the pelvic colon from folding upon itself during the first few days after the operation and to hold it in place until it becomes firmly fixed by adhesion of the approximated surfaces.

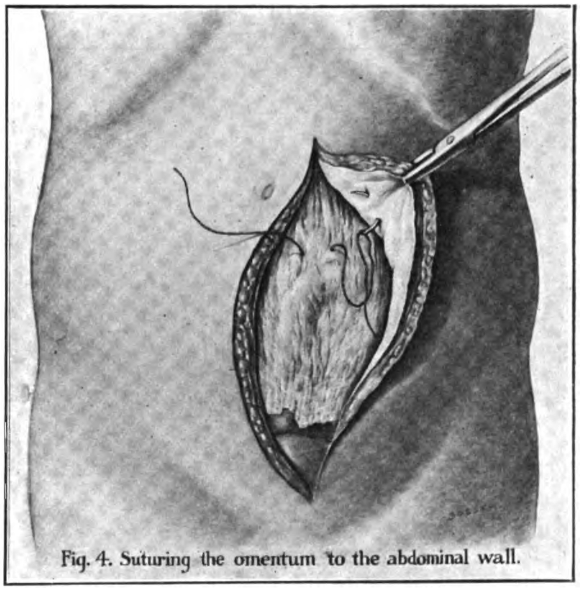

Fig. 4. Suturing the omentum to the abdominal wall.

A piece of rubber tubing three or four inches in length, just large enough to allow the passage of the stomach tube, is slipped over it and used for holding the tubes in place. This is accomplished by two tapes which are passed through slits in the outer tube and then tied around the thighs so as to hold the tube in place after it is once placed in position.

With the head of the table lowered and the small intestine held out of the way with silk covered napkins, the pelvic colon may be brought clearly into view, and any adhesions present may be readily discovered and released by snipping with blunt pointed scissors close to the guts and its mesentery. One very soon learns to distinguish between adhesions and the mesentery by the fact that when the gut is drawn up the adherent peritoneum is pulled out in a fold between which and the mesentery of the gut an open space appears. By lifting up the fold with forceps while the adherent surfaces are being separated, one may easily avoid wounding the vessels and the application of a ligature is seldom required. By delicate dissection and gentle manipulation it is also possible to avoid denudation of any large areas, thus lessening the danger of subsequent troublesome adhesions. When possible to do so, denuded areas should be covered over with peritoneum by careful suturing, using Lemberts sutures of chronic catgut.

When the pelvic colon has been properly freed it will be found that the loop reaches nearly to the umbilicus or even higher.

The next step is the further introduction of the rubber tube which has already been well lubricated with vaseline so that it will slip through the anus and the bowel as easily as possible. An assistant pushes the tube in while the operator guides the point of the tube along the pelvic colon. When the tube reaches the top of the loop the end is directed downward toward the ileo-pelvic junction at which point it is turned up into the ileac colon and passed on to the middle of the descending colon. It is important that the end of the tube should lie free in the bowel without impinging against the side of the gut in such a way as to incur the risk of rupture of the intestinal wall from pressure necrosis. In cases in which marked colitis exists, the bowel sometimes contracts so firmly upon the tube that it is necessary to pause when introducing it until the gut relaxes. When the tube is finally in place the assistant takes care to hold it firmly in position and as soon as the operation is completed ties the tapes around the legs in such a way that it is impossible for the tube to slip out of place. The accompanying cut (Fig. 1) shows the pelvic colon after adhesions have been broken up and the tube placed in position.

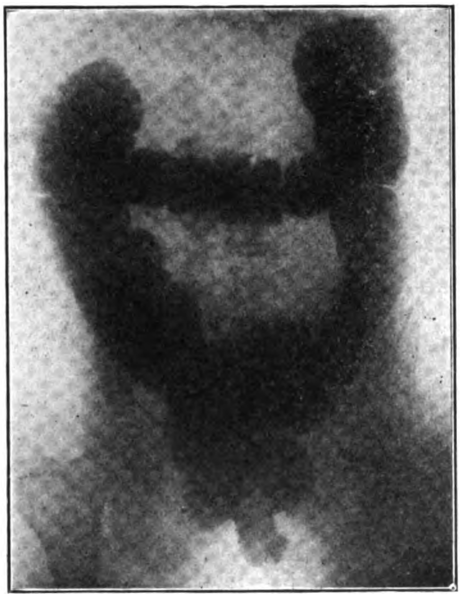

Fig. 5. Case of Mrs. McC., rectal constipation due to prolapse and adhesion of the pelvic colon before operation.

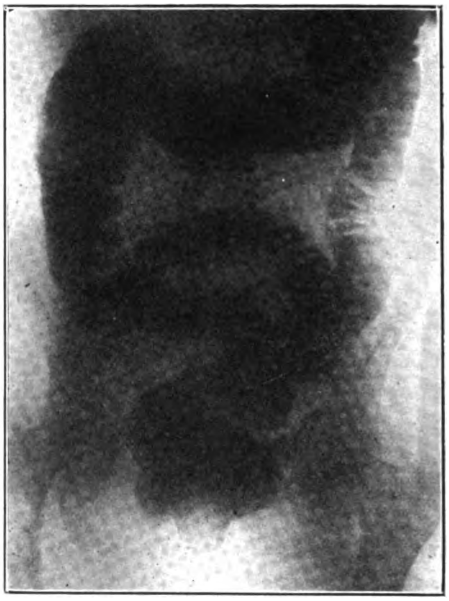

Fig. 6. Case of Mrs. McC. after operation showing the pelvic colon held in position suspended by the omentum.

If the adherent condition of the pelvic colon is not discovered until after the abdomen is opened, as may happen in operation for removal of a diseased appendix or to meet some other indication, the operator follows the pelvic colon down inside of the abdomen until the rectum is reached, while the assistant inserts the tube for a few inches. The operator guides the end of the tube along the bowel as the assistant gently pushes it in. Some difficulty is often experienced due to the fact that the end of the tube is caught by folds of membrane known as Houston's valves. This difficulty may be avoided by folding over the end of the tube about eight inches and introducing the loop. The looped tube easily slips by Houston's valves and may be easily caught by the operators finger and brought up into the pelvic colon where it is held for a moment between the thumb and finger while the assistant gently pulls upon the outer end of the tube until the tube is infolded. Then with gentle guidance while the assistant steadily passes the tube in, the end of the tube is carried along through the pelvic and ileac colon about half way up the ascending colon.

The next step is to secure the mesentery of the pelvic colon with forceps at two points as shown in Fig. 2. The omentum is then drawn down and folded back two or three inches (Fig. 3), the length of the overlap depending upon the length of the omentum and the extent to which the mesentery of the pelvic loop has been denuded of its peritoneum, one purpose of the over-lap being to cover the raw surfaces and so prevent adhesions of the small intestine. The omentum is fixed in place by suturing to the mesentery of the pelvic colon as shown in Fig. 4. The end sutures are placed several inches apart so as to prevent kinking of the intestinal loop. Several intermediate sutures are introduced to prevent folding of the omentum when it is very thin and also to avoid possibility of catching the loop of intestine, thus producing obstruction. After the suturing is finished the omentum is folded down over the mesentery of the pelvic colon so as to cover so far as possible any surface which may have been denuded in separating adhesions. The omentum may be attached by one or more sutures if necessary to cover raw surfaces. The next step is the attachment of the omentum to the abdominal wall. A heavy catgut suture is introduced into the omentum at a point a little above the upper margin of the pelvic loop. Large sized chromocized catgut or Kangaroo tendon is used.

The left side of the wound is now lifted forward so as to bring the parietal peritoneum well into view and the suture passed through the parietal peritoneum at a point sufficiently high to make sure that the pelvic loop is well supported without kinking and without over-stretching the gut. When the suture is tied, nothing remains but to close the wound in the usual fashion.

After the patient is put to bed a dose of one cubic centimeter of pituitrin is administered to induce peristalsis "place" the intestines. A solution of malt sugar, one ounce to the pint, is allowed to pass into the colon through the rubber tube at the rate of two drops or one minim per second. At this rate, the solution is largely absorbed as rapidly as it is introduced and not only supplies the need for liquids but also furnishes the carbohydrate necessary to support the heart and to prevent acidosis.

Each day a pint of an active culture of Bacillus Bulgaricus with two or three ounces of starch water is passed into the colon through the tube, the purpose being to aid in changing the intestinal flora, which is further promoted by careful regulation of the diet and the application of such other measures as the writer has elsewhere shown to be essential for thoroughgoing change of the intestinal flora.

The long tube is removed on the third or fourth day. If it seems necessary at any time to determine the exact position of the tube this may be done by an x-ray examination. Further details of the after-care of the patient are the same as those employed in laparotomies for any purpose.

A METHOD OF INCISING PAROTID ABSCESS WITHOUT INJURY TO THE FACIAL NERVE DISTRIBUTION.

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NEW YORK.

Suppurative infection of the parotid gland is most often encountered as a metastatic phenomenon. So frequently is it seen after abdominal infection that the name "celiac parotitis" has come to designate this form of the disease. The affection is one associated with great constitutional disturbance and the accompanying pain is severe. Because incision in this region will leave an unsightly scar and also because of the danger of paralysis of the facial nerve distribution suppurative parotitis has usually been treated in a timid and unsurgical fashion, the ice bag or the poultice taking the place of the scalpel until the skin itself threatens perforation when one or two short incisions are made in order to avoid the deformity following actual cutaneous necrosis. Meantime, days or even weeks of suffering have dragged on and the destruction of the parotid tissue has proceeded, the pus even working its way into the pterygomaxillary region or into the neck*

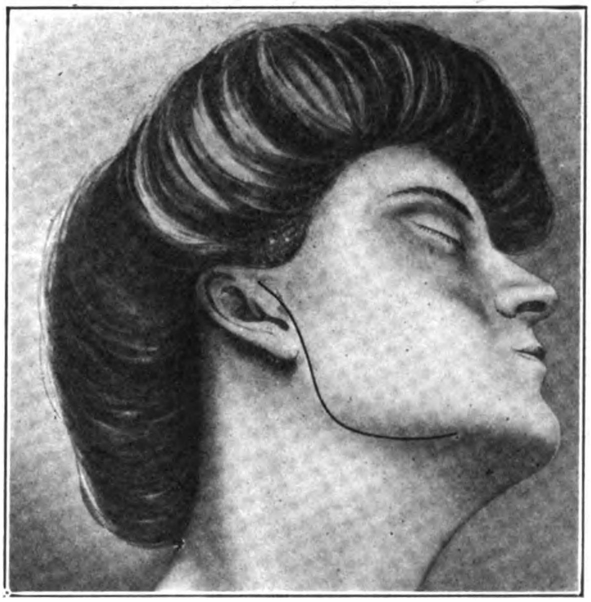

Fig. 1. General line of incision. It is shown here too long. The anterior end need not pass the border of the masseter muscle.

In Keen's Surgery, Vol. III, p. 323, Wyllys

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*Deaver, Surg. Anat., Vol. 1, p. 521.

Andrews writes: "Extensive cutting such as is done in mammary infections is impossible," etc.

For many years I have practiced a method of operating in these cases which does permit of free drainage while it avoids unsightly scarring as well as injury to important branches of the facial nerve. Instead of the long, painful wait for something to happen there is prompt action when suppuration has been recognized. Relief is immediate.

A description of the method follows, but modifications will doubtless occur to the surgeon according to the requirements of the case.

A vertical skin-deep incision is made in front of the auricle and just as close to it as possible. This incision is extended to the hollow behind the angle of the jaw and thence in a gentle curve forward as far as the projection of the anterior border of the masseter muscle. The flap of skin thus formed is reflected forward revealing the greater part of the parotid gland with its overlying fat and fascia. Incisions, as many as appear necessary for drainage, may now be made through the parotid fascia into the gland itself, the lines radiating in a general way along the course of the pes anserinus. No incision, however, should cross the line of Stenson's duct for fear of salivary fistula. Deeper collection of pus may be evacuated through this same cutaneous incision by puncturing through the fascia behind the ramus of the jaw and then enlarging the opening with the director and dressing forceps.

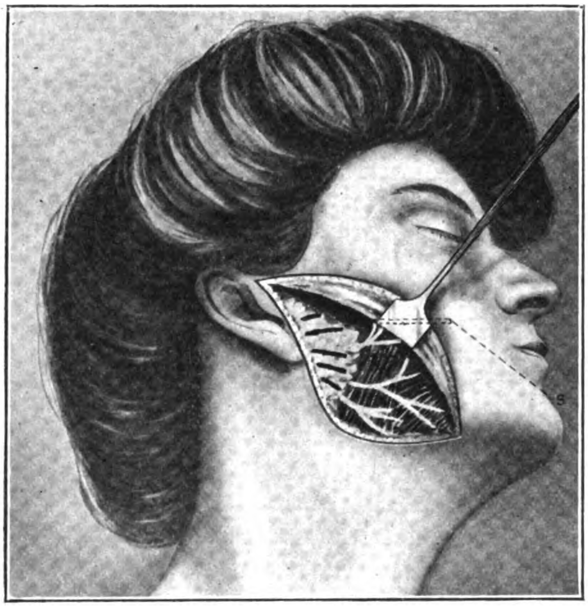

Fig. 2. *S* leads to the double dotted line representing the location of Stenson's duct.
The white lines represent the nerve branches in diagrammatic manner. The heavy dark lines are the incisions in the parotid gland. The wound, as in Fig. 1, runs too far forward.

The openings into the parotid may be packed or otherwise drained, the cutaneous flap not being replaced until healing is well advanced, when it may be held in position with adhesive strips. A glance at the figures will make the entire procedure clearer than my words. The resulting cicatrix is far less obvious than smaller ones made by drainage through the cheek.

THE OPEN TREATMENT OF CERTAIN FRACTURES OF THE LONG BONES.

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Since the *x*-ray is daily discovering to the layman what the surgeon has long known, namely, that nearly all results in fractures of certain bones and situations are more or less grossly imperfect, the current literature abounds with the reports of experiences with the open method of treatment of fractures. The practical side of the management of a concealed lesion by looking at it and giving it direct treatment shows up in strong contrast to older methods, and needs only to insure simplicity and freedom from sepsis to come into its own. So fully is the need felt not only by the "physician and surgeon" of the remoter districts but by the skilled surgeon himself that a discussion of various views and references to the abundant literature is beside the interest of the question at issue. We all know that something is coming in the practical management of certain of these fractures, and a variety of opinions but obscures the problem.

Just what fractures of long bones may be safely managed by external splints must depend on special circumstances and environments, but more particularly on the features in individual cases, i.e., the evident accuracy of approximation, the surroundings of the patient, the accessibility to skilled help, and opportunity for hospital treatment. While these conditions in a way help to control any surgical treatment, the necessity for overcoming them may determine the difficulties. A short or crooked leg or arm as the result of a fracture leaves a permanent monument, which neither the patient nor the surgeon can confront without a disagreeable reminder to the one, and more or less persistent mortification to the other. Under good surroundings the skilled hand should be able to secure practically a straight leg or arm of normal length in every fracture of such bones not hopelessly comminuted, and non-union in the normally healthy patient should be practically unknown.

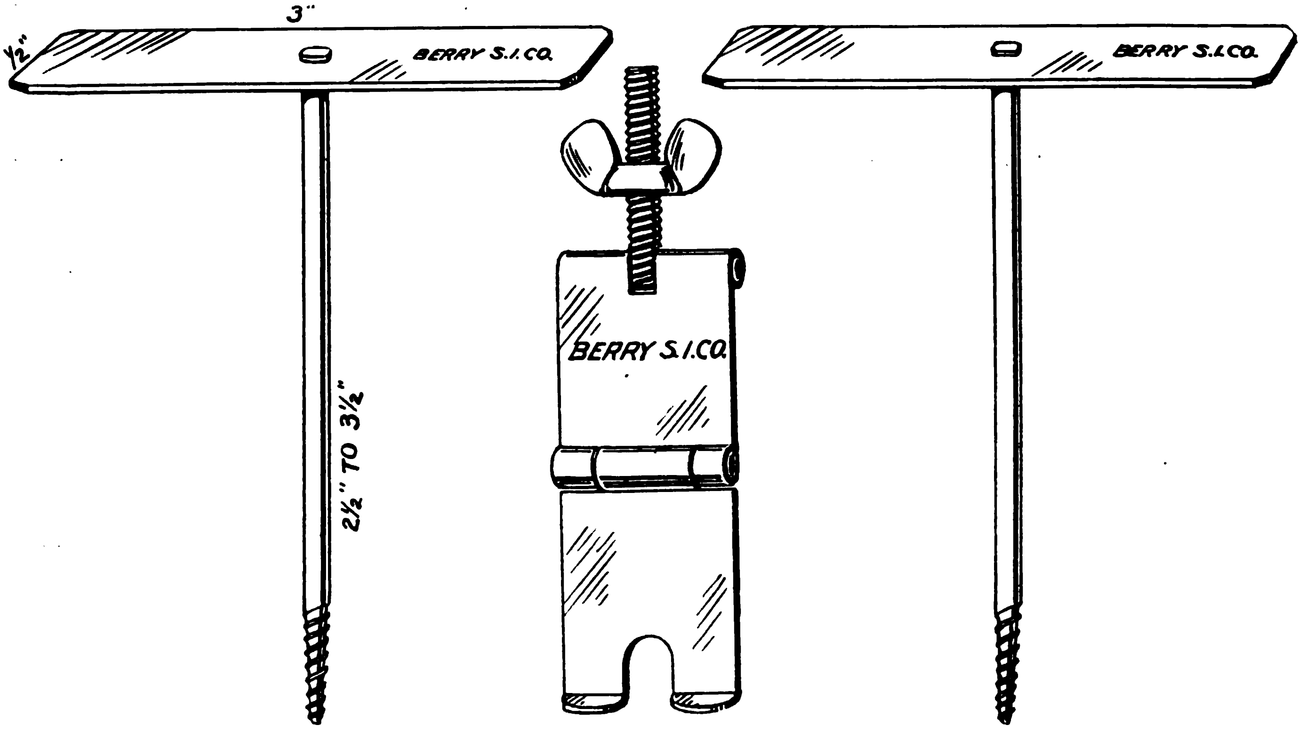
Prominent in the recent literature are two articles upon the subject, in both of which the open treatment in one form or another is earnestly advocated after one method or another. In the article by Estes of South Bethlehem (*Annals of Surgery,* July, 1916) a very full review of the various methods of treatment of fractures is given together with some extensive statistics, the whole subject being so well discussed as to bring the matter up to date. A report from John O'Connor of the British Hospital Service at Buenos Ayres (*Annals of Surgery,* January, 1915) besides being very explicit is also quite radical. It is easy to see from his article, however, that O'Connor is a practical artisan, as every operator who undertakes bone surgery should be if he expects to accomplish great results, and leaving all theory aside he applies the same principles of treatment to hidden bone injuries that he would to any other hidden lesion. In the treatment of all transverse fractures, in which union is not progressing at the end of thirty days, and in all recent fractures oblique in direction, in which the *x*-ray does not show proper apposition, he unhesitatingly makes an open operation and applies the Lane plate.

This plan of treatment represents a definite technic which it seems may well be modified along the following lines: The difficulties in getting and maintaining good approximation in fractures of the humerus and femur in the shaft, and occasionally in fractures of the tibia and fibula place these lesions in a class by themselves. If a simple method of fixation can be provided it is fair to assume that most surgeons would prefer to treat every fracture in these regions that is not clearly shown by the *x*-ray to be properly opposed, by an open operation and adjustment. Without doubt fractures in this region, in which union is not progressing after 25 or 30 days, demand prompt exposure of the field and direct treatment. In most of the text-books fully a dozen reasons are given for failure of union, but as a matter of fact there are but two frequently occurring causes; one of these is imperfect approximation and fixation, and the other the interposition of soft tissues. The first of these is easily determined by the *x*-ray; the latter is rarely discovered by any means until the open operation is made.

It is not believed to be worth while in this article to present either arguments or authorities for the views here expressed. The literature is too full of this subject to even justify its re-presentation in a practical discussion. It is my object to present a simple and safe method of approximation and fixation of these fragments for the consideration of those surgeons who believe the operation is demanded, and not to attempt to make any converts to this step in surgery. Accepting more or less the position taken by O'Connor, which accords with the views and practice I have for a long time advocated, and as ably presented by the authorities above referred to, I would present the following plan of practice: In all fractures involving the shaft of the humerus or femur, as well as the tibia, in which the *x*-ray shows the approximation is bad, I advise early operative intervention and fixation after a plan to be described. Of course, at any time observation shows shortening or angulation, with or without failure of union, these steps are to be entertained, and no delay is to be allowed where the *x*-ray shows an unallowable failure of approximation.

In the device figured in this article the shaft of the gimlet is made of the same material as the ordinary wood screw. The shaft is from 2½ to 3½ inches in length and 2½-3 mm. in diameter. The handle, which is fitted firmly upon the shaft, is more or less malleable, so as to be bent, if necessary, by a pair of strong pliers into adaptable shape. A simple folding clamp, with a set screw, holds the two handles in apposition after their introduction into the bone. It is found that about 3 inches is all that is necessary for the length of these handles, and ¾ inch in breadth is proper.

In preparing the patient for operation, which in simple fractures should be delayed two or three days until the acute stage has subsided, ordinary surgical cleaning is all that is necessary. The field of operation is painted with tincture of iodine and by a free incision the seat of the fracture exposed. By the use of a suitable pair of forceps (either those specially designed for the purpose of holding the fragments, or even the ordinary lion-jawed forceps, may be very satisfactorily used) the two ends are brought in apposition after free and liberal removal of all obstructions in the soft parts or bone. In recent fractures usually the parts can easily be brought together while extension is made. In old-un-united fractures more separation of the soft parts and manipulation are necessary. After the parts have been placed in the position that is designed to fix them, with a small hand drill a hole is made in the bone and the gimlet screwed into it. This opening is made about 1½ inches from the point of fracture. A corresponding hole is made in the other fragment, the other gimlet introduced, and the handles approximated. The depth to which the screw penetrates depends upon the firmness of the hold obtained. Usually it is completely through the medullary canal and should involve the opposite side of the shaft. In making the adjustment it is desirable that not even the gloved fingers should be passed into the wound, but all separation and manipulation should be done by instruments. As the purpose of this operation is to get apposition and fixation of a practical kind, it is not believed wise to "fuss around" too long to make this apposition absolutely accurate, but that if it is relatively so it is better to leave it slightly imperfect than to run the risk of infection by too prolonged manipulation. The callus which will be thrown out around the seat of fracture will soon perfectly modify all irregularities. Nor should too much manipulation be made with the gimlets after introduction, lest the hold in the bone be loosened. Where it seems necessary to make the approximation firmer two pairs of clamps are used. A stab wound is made upon either side of the wound made to expose the fracture, and through this stab wound the shaft of the gimlet is introduced into the drilled hole into the bone. This can be done under the eye through the open wound. A similar stab wound is made upon the other side of the fracture and the other shaft introduced. The second pair of gimlets is then applied through the open wound as before described.



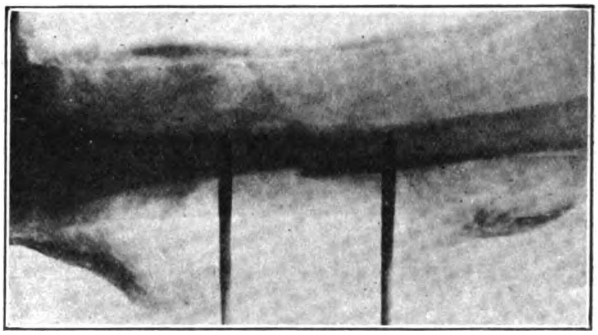
The instrument figured here consists of two gimlets each made in two sizes, the shafts of which are respectively 2½ and 3½ inches long and 2½ and 3 in diameter. The shaft is of uniform size terminating in a slightly tapered screw and about ¾-inch in length. This shaft is made of an ordinary clothes hook straightened out. This shaft is firmly fitted to a flat handle about three inches in length and ½-inch in width and 1/20th of an inch thick, made of German silver. The clamp is made of the same material, consists of a hinge an inch and a quarter in length and three-quarters broad and one-sixteenth of an inch thick, closed with a brass set screw.

After the clamp has been placed upon the handles and the adjustment is satisfactory the periosteum is closed by catgut sutures. If it seems necessary in any way to fortify the approximation a catgut ligature may be carried around the seat of fracture and tied about the shafts of the gimlets in any way indicated. There can rarely be any occasion for this step. The muscles are drawn together and the skin closed well up around the shafts of the gimlet. In some instances the wound may be mopped out with a solution of iodine. Careful hemostasis should be secured and no drainage is necessary. If two pairs of clamps have been employed a plaster bandage is not required as these will afford all the fixation needed. If only one pair is used the limb is then secured by a light plaster of Paris bandage, engaging the joints above and below the point of fracture; careful gauze dressing is wound around the shafts for protection and a window is cut about the wound to permit inspection. The gimlets are allowed to remain in place eighteen to twenty days or even longer, according to the choice of the surgeon; usually a shorter time than this will insure union. Of course, if infection should take place, which can be only from some fault in the technic, the foreign body should be removed at once. Infection can follow any plastic or constructive operation if not carefully done, but there is abundant demonstration that the retention of aseptic foreign bodies in bones and joints for weeks is quite consistent with primary healing. In the surgical section of the 1916 meeting of the American Medical Association, John Gerster reported over thirty cases of weight traction made upon a spike passed through the femur above the condyles maintained for as long a period as four weeks without infection. At the same meeting Mann of Indianapolis surprised the experienced bone surgeons in the section by his report of the toleration by the joints of buried screws and nails. All this merely indicates that the temporary fixation of bone by removable foreign bodies is safe if carefully done. I have used the instrument as described in eight cases which are reported below with perfectly satisfactory results in all, with infection but once and in the case where infection occurred through an acute fracture of the thigh, firm union took place with a good function. O'Connor declares that the screws in the Lane plate do not become loosened if properly introduced. In my cases the shafts of the gimlets were firm and aseptic when removed after 15-20 days. The advantages of this method of fixation over the Parkhill clamp are that it is very much simpler and easier of application and far less cumbersome, and while perhaps the approximation of the fragments is not always quite so accurate as can be obtained by the four shafts in the Parkhill clamp, the practical results are in every way satisfactory. Its great advantage over the Lane plate is that there is no foreign body left to give trouble afterwards, and that inasmuch as an accurate fixation maintained for seven or eight days will insure satisfactory union in nearly any healthy individual, it is easy to remove the clamps at any time after the end of two weeks if there is any occasion for it. The fixation is far more firm than can be obtained by the wire or other suture.

A report of the cases follow:

CASE I: White male, 24 years of age; radiogram showed an oblique fracture of the left tibia, with considerable displacement, ununited after nine weeks in plaster. This fracture had been plated at the time of the accident, but because of suppuration, the plates were removed on the tenth day and plaster employed. After well curretting the ends of the fragments apposition was readily accomplished and the gimlets introduced as outlined above. A heavy flannel bandage was used to protect the skin, and plaster bandages were carried from the toes to well fix the knee. A window was left where the plaster wound around over the gauze dressings at the wounds. These dressings were so applied as to be easily renewed when soiled. There was little pain, and the dressings were only slightly stained, requiring change only on the second day. A dry scab formed about the shafts, but there was not even serum after the first few days. The gimlets were removed on the 16th day, reverse turning easily releasing the shafts after the clamp was loosened. The shafts were firmly fixed in the bone, there having been no necrosis. After examination the wound was dressed and the plaster was not changed, as fixation was satisfactory. At four weeks the plaster was removed and union found to be firm; plaster reapplied and when finally removed at the eighth week firm union was found.

CASE II: White male, age 21 years. Fracture involving both bones at the middle of the forearm. In plaster six weeks. The ends of the fragments were freshened by the bone curet; the radius only was engaged by the clamps. After fixation the skin was protected by a flannel bandage, and a plaster cast applied over this about the gauze dressings at the wound site. The result at five weeks was good union.

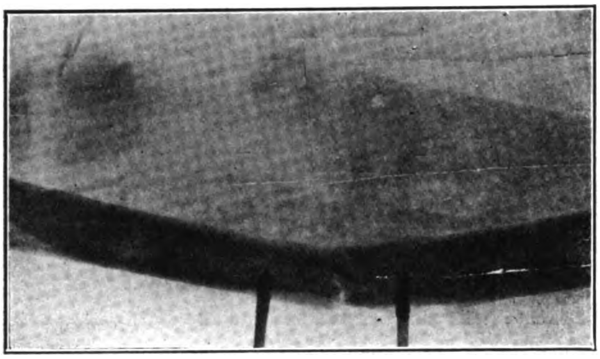


Shaft of Humerus At Twenty-first Day.

CASE III: This was a colored male, age 21, with a wire still in the radius, after a repair of a break almost exactly the counterpart of Case 2. After removal of the wire the same plan was employed with good union as a result.

CASE IV: White male, age 25, sustained a fracture of both femora in an automobile accident; in the right femur supra condyloid; in the left fracture of the shaft about the middle third. The original dressing was extensive with long lateral splint and sand-bags for the left leg (double inclined plane for the supracondyloid break.) After a week the radiograms showed marked overlapping of an oblique fracture in the left shaft, with a half-inch shortening. After exposure much effort was required to get satisfactory position, when fixation was easily maintained by the gimlet screws. There was considerable oozing in this case, but no shock and no exceptional pain. A full sized window was left at the site. Some pus appeared around the upper gimlet shaft on the fifth day, and there was a discharge of serum and pus in moderate amount for a week or more, but no constitutional symptoms of any importance. The gimlet was taken out on the eighth day while the plaster cast was left in position. The cast was replaced at the fifth week and when finally left off at the eleventh week firm union was found. Notwithstanding a double fracture, he now walks with barely a limp.

Case V: Colored male, age 26. Old ununited fracture upper third right humerus. Dressed outside the hospital at the time of the accident with plaster cast, six weeks previous to admission radiograms showed an oblique fracture, ends overlapping, fibrous union only. The ends were dissected free and easily approximated. In this case the obliquity of the break made it convenient to pass one of the gimlets through the tip of one of the fragments so as to practically nail the two surfaces together. The other treatment and dressing were the same as outlined in the other cases. The gimlets were removed on the 16th day, at which time a new plaster cast was applied, which was left in place for four weeks. Firm union resulted.



Shaft of Femur At Twenty-first Day.

Case VI: White male, age 19. Ununited fracture of the left humerus. Three months after fracture, no union resulting, the wound had been opened, the ends freshened and fixed with chromic catgut; just how was not clear. On exposure five weeks later the ends of a more or less oblique separation with overlapping and angular deformity and much adventitious tissue presented. The fragments were well freed and the ends scraped. In order to secure firm fixation two pair of gimlets were used in this case, and a very light plaster cast applied. Good union followed.

Case VII: The illustrations apply to this case. White boy, age 11 years. Sustained a fracture of the right fibula and right femur, at the upper right humerus of middle shaft. Three weeks later union was found at the ankle break, but the radiograms showed angularity and overlapping at the other sites, with free movement. Both fractures were approximated as shown in the illustration. Accurate care was not observed when the plaster was applied to abduct the thigh, and there is shown a curve in femur so common after these fractures. No persistent effort was made to get absolute accuracy in the humerus, but the arm now shows a smooth point of union. The gimlets were introduced and the dressings applied as in the usual manner, no extension was made. The boy had no shock and but little pain. After 36 hours he was comfortable throughout his convalescence. The gimlets remained dry, and when they were removed on the 19th day were found tightly grasped in the bone. At this dressing the plaster was changed upon both limbs and an effort was made to correct the curve in the thigh which was still flexible. Union in the humerous was perfect. Plaster was re-applied to both arm and leg. From the humerus it was removed at the fifth week and the femur at the eighth week, when a perfect functional result was found in both.

Case VIII: Mrs. P., seen with Dr. Philips. She sustained a fracture at the surgical neck of the left humerus. This was supported by an ordinary shoulder cap and a V-shaped auxiliary splint and made very comfortable, but radiogram on the fourth day showed a distal fragment well up behind the short piece which overlapped the lower fragment for an inch and a quarter and was turned outward making almost a T-shaped fracture. Dr. Sherrill who was interested in the instrument, assisted me on the sixth day after the injury in applying the gimlet. Reposition was easily effected and the woman suffered so little inconvenience from the dressing that she went home on the sixth day and continued to supervise her household affairs. The clamps were removed on the twenty-third day and firm union was found to have taken place.

I believe the following conclusions to represent a sound surgical basis:

1st. The advantage of directing the adjustment and fixation of the fragments in most fractures of the thigh and humoral shaft, as well as many of the tibia and other long bones, is so positive as to need only a safe and simple method for general adoption.

2nd. Badly apposed, as well as ununited fractures of the long bones, conditions easily recognized by modern methods, demand undelayed treatment by the open method.

3rd. As fixation by absorbable ligatures requires as much or more manipulation as the putting in of the plates, the risk of infection is hardly compensated for in view of the insecurity; and wiring of the fragments accomplishes poor fixation with the drawback of the retained foreign body.

4th. The Lane plate in skilled hands accomplishes perhaps the best fixation but carries with it the serious objection to the inexperienced of infection, and even where all seems to go well later removal is often required.

5th. If by a simple inexpensive and safe method of fixation, not even involving the broken surfaces, approximation can be maintained, it should become the ideal method.

In determining the level for amputation for gangrene of the foot, the Moskowitz test of arterial sufficiency is a helpful guide. A thigh amputation is always surer of healing than one below the knee; and, speaking generally, the older the patient the smaller the chance of a successful leg amputation.

THE CANCER CAMPAIGN QUATERNARY; THE PROBLEM; THE PUBLIC; THE PATIENT; THE PHYSICIAN.

WILLIAM SEAMAN BAINBRIDGE, A.M., Sc.D., M.D., C.M.
NEW YORK CITY.

No dissenting voice, so far as I am aware, has been raised against the movement, now so substantially under way, to educate the general American public concerning cancer. For more than a decade, as my published statements attest, I have emphasized the need for enlightenment on the part of the layman with reference to this disease, of which so much negative and so little positive information is available. I have endeavored to impress upon the medical profession the importance of so conducting the campaign of education as to avoid arousing needless alarm in the public mind, and to obviate the dissemination of conflicting views, theoretical observations, and deluding hopes. I have consistently and persistently maintained that physicians should be educated primarily, laymen secondarily, and that pending the establishment of incontrovertible conclusions, hypothetical matters should be discussed *in camera,* and so cautiously that the promulgation of erroneous, premature, and misleading conceptions concerning any phase of the cancer problem would be reduced to a minimum.

The campaign of education has been under way long enough now for some estimate to be formed concerning the results, good, bad and indifferent, which it has yielded to date. It is time to ask ourselves whether the platform upon which we have been conducting the campaign has met the requirements. or whether it needs to be revamped in accordance with the results accomplished. We may well ask ourselves frankly, "Are we on the right road?" "Have we failed to notice and to point out any of the guide-posts along the highway?" "Have we misinterpreted any of the danger-signals?" "Have we wandered into bypaths fraught with dangerous pitfalls for those whom we are supposed to lead?"

No one, perhaps, is in better position to answer these questions than is the surgeon whose field of activity brings him in contact with a large number of persons directly or indirectly concerned with malignant disease. No one is more frequently importuned for what the patient, or the patient's friends and family, consider the final word concerning this or that piece of information—or misinformation—gathered from the columns of the daily press, from the "popular medical lecture," from the club, or from the medical meeting which the public may attend at will. Over and over the surgeon is asked: "*Is* cancer contagious?" "*Should* every little wart and mole, or every little lump and bump, be removed?" "*Will* I have cancer if I eat meat?" "*Must* I eat rice to prevent having cancer?" "*Does* persistent indigestion mean cancer of the stomach?", and so on, according to the hobby of the particular author or lecturer under whose temporary tutelage the individual has passed and according to the peculiar psychological constitution of the said individual.

It has been said, in quite another connection, that "Experiments have two great uses—a use in discovery and verification, and a use in tuition. They were long ago defined as the investigator's language addressed to Nature, to which she sends intelligible replies. These replies, however, usually reach the questioner in whispers too feeble for the public ear. But after the discoverer comes the teacher, whose function it is so to exalt and modify the experiments of his predecessors as to render them fit for public presentation." In no field of investigation with which the physician is concerned may it be more truly said that Nature's replies to our questionings come "in whispers too feeble for the public ear;" in no field of educational endeavor is it more important that the teacher render the subject matter "fit for public presentation," than in this campaign of education concerning cancer. The reason is involved in the very complexity of the campaign. This must take into consideration the quaternary: the cancer *problem,* which, as all know, is full of complexities; the *public,* as a whole; the *patient,* as an individual; the *physician,* who is the one to deliver the message.

THE PROBLEM.

Ever since the inauguration, less than twenty years ago, of the scientific study of cancer, the questions connected with this malady have multiplied so rapidly that they have become merged into one great, complex and unsolved problem. The chief constituents of this mystifying whole are concerned with: (1) the *cause;* (2) the *diagnosis;* (3) the *prevention;* (4) the *cure,* of cancer. Each one of these at once introduces us to a labyrinthine tangle of conflicting opinions, and hence of uncertainty. The layman conducted into this maze, unless by a skilful leader, is sure to become confused and discomfitted.

Cause.—One of the organizations concerned with the propaganda against cancer recently issued a circular entitled "Fighting Cancer with Facts." Unfortunately, the one great and all-important fact, the *cause* of cancer, is not in our possession.

(*To be continued*).

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

New York, April, 1917.

THE DIAGNOSTIC HOSPITAL.

Surgical treatment depends for its efficiency, first, upon correct diagnosis. So many additions to our knowledge of diseases have been made in the past quarter of a century, that diagnosis of surgical ailments has long ago passed beyond the abilities of any one individual. Team work, implying technical cooperation and coordination, is now required for the best results. The surgeon who is most competent to operate upon the multitude of surgical lesions of the trunk or cranium is not the person who can best diagnose the lesions which he is most qualified to cure.

So complicated and diversified have the means of diagnosis become that no single person can be proficient in all. Before the true nature of a surgical malady can be discovered there must often be invoked the aid of the *x*-ray, blood examinations, serum tests, bacteriologic studies, nerve tests, ocular examinations, and investigations of cerebro-spinal fluid. These are not all within the field of any single individual, much less are they a part of the equipment of the therapeutist.

Diagnosis need not necessarily be followed by treatment. It may stand apart. The patient with an accurate knowledge of what ails him may make such use of the knowledge as he sees fit. The disease is his. He naturally should want the best knowledge concerning its location and nature that can be had. The family physician with this information is in a position to advise the patient where he may go for the best surgical treatment. The next natural step would be to go with the accurate diagnosis to the surgical therapeutist and have the trouble corrected.

Now the patient with symptoms which distress him does not first bethink himself of diagnosis as a separate thing, neither does his family physician. The patient is sent to the surgeon who is selected for his ability to treat conditions which have symptoms that approximate the symptoms with which the patient suffers. And the surgical therapeutist must undertake the functions of the diagnostician; but inasmuch as he cannot master all things we find the surgeon who attempts to combine the diagnostician with the therapeutist falling short of the possibilities of each. The surgeon usually goes ahead and gets enough diagnosis to justify him in his own mind in proceeding to follow some specific procedure of treatment.

Modern surgery has outgrown this method. The surgeon diagnostician-therapeutist is as much of an anachronism as is the obstetrician-pediatrist, the general surgeon-oculist, or the apothecary-internist of a past generation. The modern reproach of surgery is, that too often the wrong operation is done because the correct diagnosis is not made. The inexcusable result is seen in operations upon the vermiform appendix when the disease is stone in the ureter, hysterectomy when the condition is pregnancy, salvarsan injection for lues when the disease is eczema, ovariotomy when the disease is hypertrophis rhinitis, laryngectomy when the disease is syphilitic laryngitis, and gastro-enterostomy when the disease is abdominal crisis of lues. A recent surgical report recites a case of syphilis of the spinal cord in which the patient underwent four abdominal operations, the last of which was for adhesions caused by the former three operations.

Diagnosis should be a distinct branch of learning. Surgical diagnosis cannot be separated from medical diagnosis. The specialty should be diagnosis; and the specialists should be a coordinated group of scientists depending upon cooperation with each other for their efficiency. Diagnosis is no longer a one-man field.

Imagine an institution into which a patient might go, where all of the technic and learning concerning diagnosis might be concentrated upon his case! There is enough skill and scientific knowledge now available to diagnose most every ailment. Such an institution would coordinate all of these departments of learning. The gastro-enterologist, the bacteriologist, the serologist, the roentgenologist, the hematologist, the urologist, the ophthalmologist, the neurologist, and specialists in all the other branches of diagnostic learning, cooperating to arrive at a diagnosis, is an utterly different function from that of making examinations for the purpose of finding something which one may treat or operate upon.

When the scientific necessity of such an organization of diagnostic forces is realized and the advantage to be derived by introducing the economic and psychic principle here involved is contemplated, it becomes obvious that this must be the method of the future. It is not altogether a dream, for our own Mayos have come so close to it that it is virtually here; and already before the war Germany had actually established diagnostic hospitals. We have, in this country, such equipments in the field of mental diseases.

The highest interest of the sick demands such organizations. The best efficiency demands that they be free from the commercialism which exploits the sick. They must repreesnt either the syndicalist principle as exemplified at Rochester, the socialist principle as exemplified in Germany, or the cooperative principle yet to be perfected in this field.

The diagnostic hospital need not be geographically apart from the hospital where treatment is applied. The two may be adjacent or under the same roof. The diagnosticians and the therapeutists need not be strangers. Indeed, they should be freely in consultation with each other. Diagnosis can often be promoted by the light which the therapeutist can throw upon it; and the surgeon in his treatment can often be guided by the finer knowledge of the diagnostician. The important factors are that the agencies of diagnosis should be united and cooperative, and the surgical therapeutist should be relieved of responsibilities which the progress of science and techinic have carried beyond his sphere.—JAMES PETER WARBASSE.

The *New York Medical Journal* has filled the editorial vacancy created by the death of Dr. Claude Wheeler. Dr. Smith Ely Jelliffe, well-known as a neurologist, psychanalyst, author, translator and medical journalist, will now divide editorial responsibility with Dr. Charles E. de M. Sajous.

Dr. Jelliffe was once before associated with the editorial work of the *New York Medical Journal* when the *Medical News,* of which he was the editor, was consolidated with it. He has for many years published the *Journal of Nervous and Mental Diseases,* and a few years ago, with Dr. White, he founded the *Psychoanalytic Review.*

LETTER TO THE EDITOR.

Pittsburgh, Pa., February 23, 1917.

Editor AMERICAN JOURNAL OF SURGERY:

I cannot refrain from commenting upon a statement in an article by J. F. Baldwin in the *Medical Record* copied by you in the February number of THE JOURNAL, under the caption "Nitrous Oxide-Oxygen Anesthesia," in which the author attempts to convey emphatically his opinion that nitrous oxide-oxygen "should be looked upon as the most dangerous anesthetic that can be used, even in the hands of the most experienced"—and that its field of usefulness (perhaps he would say "excusefulness") is very, very limited. I do not know how extensive is his experience with N_2O-O. But how he can so boldly contradict the experience of such authorities as Crile, Gwathmey, Teeter, McKesson, Henderson, Gatch *et al.* is beyond explanation.

Anesthetists and surgeons throughout the surgical world know that the "field" of nitrous oxide-oxygen anesthesia is constantly widening; that it is fast becoming indispensible in general surgical clinics and hospitals; that more and more physicians, surgeons and obstetricians are embracing its aid through expert anesthetists or by personal study; and that in experienced hands it is *the safest* anesthetic agent, both during and after operation, known to the profession. In testimony to its almost unlimited field of usefulness I mention below some operations selected at random from records of the Western Pennsylvania Hospital that are being performed almost daily under N_2O-O with entire satisfaction:

Reduction of fractures, tonsillectomy, hydrocele, colostomy, cholecystectomy, drainage of abscess, bone curetting, vaginal hysterectomy, suprapubic prostatectomy, abdominal hysterectomy, fistula in ano, boneplating fractures, urethral dilatation, enterostomy, amputation of thigh, removal of vesical calculus, appendicectomy, mobilization of joints, decapsulation of kidney-bilateral, nephro-lithotomy, curettement, suturing lacerations of fingers, mastoidectomy, reduction of dislocations, hernioplasty (inguinal and ventral), reduction of fracture of nose, resection of rib, excision of rectal tumor, drainage of knee joint, forceps delivery, excision of carbuncle, excision of cervical glands, hemorrhoidectomy, nephrectomy, amputation of breast, oophorectomy, trachelorrhaphy, epididymotomy, perineorrhaphy, avulsion of toe nail, excision of lipoma, gastro-enterostomy, thyroidectomy, colpoceliotomy removal of needle in hand, extraction of teeth, lumbar puncture and uretero-lithotomy.

The indications for selection of this anesthetic have been varied—pulmonary, renal or cardiac complications, anemias, pathologic debility, acidosis, brevity of operation, preference of patients, etc. As to distinct contraindications, we have come to regard very few indeed. The duration of administration has ranged from three or four minutes to four hours and forty minutes; the patients' ages from 3 to 84 years.

J. R. McCurdy, M.D.
Chief Anesthetist of Western Penna. Hospital.

Surgical Suggestions

Before terminating a mastoid operation scrape clean the exposed bone surface. The wound will granulate more quickly.

Frontal or ethmoid sinus suppuration, causing headache and fever, may easily be mistaken for typhoid, especially in children, if the physical examination has not been thorough.

When operating upon a brain abscess secondary, for example, to mastoiditis or frontal sinusitis, pass a grooved director along the aspirating needle and insert the tube drain *before all the pus has escaped;* and make sure that pus comes through the tube—otherwise the drain may not be properly entered into the abscess.

Some individuals of seventy are as feeble, physically and mentally, as many at ninety, and, on the other hand, one often sees people of eighty as vigorous and healthy as the average at seventy. Medically, therefore, we should consider as "aged" those who are very old in their tissues and functions no matter how old they be in years.

Strangulation or threatened strangulation of a hernia is a fairly common experience among the aged. An operation for its relief—even a radical hernioplasty—under local anesthesia (preferably not cocain) is usually well borne, if the strangulation of the bowel, when this is involved, is of but short standing. Even a resection of the gut, serious as is the condition which makes this necessary, is by no means always fatal in the aged.

Colostomy and gastrostomy for inoperable cancer are, with proper indications, legitimate operations; but their nature should be explained to the patient himself if his mind is clear, and he should be allowed the opportunity to decide whether or not he will accept what the surgeon can give him in exchange for what he takes away.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

Medical Compensation For Dispensary Service To Injured Workmen.

As a result of the passage of workmen's compensation acts in 33 states of the Union, numerous questions have arisen requiring legal interpretation of the provisions of the laws. Some very practical problems require the formulation of policies by institutions with reference to their attitude towards industrial accidents, the victims of which present themselves for hospital or dispensary treatment. Under all the laws, a man suffering from an industrial accident is entitled to medical or surgical treatment for a definite period of time during which he is to receive from one-half to two-thirds of his regular wages.

What is to be the position of charitable institutions towards such an applicant for emergency relief? He is scarcely entitled to treatment as a charity when provision for the payment for surgical service is made part of the liability of industry. A Committee of the American Hospital Association (*Modern Hospital*, February, 1917) points out that there is a large variation in present methods of dealing with situations of this type.

First, a dispensary may refuse treatment on the grounds that these are not cases for charitable care. This policy, however, is indefensible in the face of an emergency and thoroughly impractical from the standpoint of public sentiment.

Second, a dispensary may treat an occasional industrial accident case for nothing or for the nominal dispensary fee usually exacted. This course may be followed when the number of cases is too small to make it worth while to establish a special policy.

Third, the dispensary may give a single emergent treatment and then refer the patient to a member of the surgical staff who is to treat the patient as a private one at the dispensary and send his bill to the established authority.

Fourth, the institution may require the private treatment to be given at the surgeon's office.

Fifth, the patient is accepted by the dispensary and treated, but charged a higher fee, for instance, one dollar per visit, which is collected from the insurance or industrial accident board. The fee in this instance is retained by the hospital.

Sixth, the sufferer receives regular attention at the dispensary for which a higher fee is charged, which is divided between the surgeon treating the patient and the institution at which the service is given.

It is patent that the questions involved in the above methods are by no means easily answered. When a large number of applicants for treatment exist the difficulties are serious and the financial policy merits very careful consideration.

In carrying out the provisions of workmen's compensation laws there must be justice to the patient, the surgeon, the employer and the hospital or dispensary. It is scarcely fair that charitable institutions should stand the expense of treating industrial accident cases without receiving an adequate return, such as would accrue were the patient treated by a private practitioner. It is not entirely just that the dispensary should receive full financial return for services performed in cases of this character to the exclusion of remuneration to the physician or surgeon actually rendering the service. To exclude emergent industrial accidents from the opportunities presented by the adequate surgical facilities afforded by dispensaries and out-patient departments of hospitals is unfair to the patients. Furthermore, in some communities such exclusion would limit the field of usefulness of a well equipped dispensary.

Special dispensaries are now being developed by employers and indeed by insurance companies with a view to meeting the diagnostic requirements of industrial accidents. It is doubtful, however, whether there is to be a distinct gain for the patient by having medical institutions developed under such auspices.

With a view to protecting the best interests of surgeons, patients, institutions, and the public, this particular social and economic problem must be carefully scrutinized and judiciously solved. Whether private or institutional treatment of industrial accident cases presents a most satisfactory solution of the problem is thus far undetermined. In all justice to the physicians and surgeons, there should be recompense provided for his technical skill, whether the patient is treated in his own office or is by courtesy given relief at a dispensary. For an institution to arrogate to itself the entire fee is to perpetrate an injustice upon the surgeons whose services have been volunteered for the treatment of those unable to afford the services of a private practitioner. The compensation acts, however, contemplate relieving the victims of industrial accidents from the necessity of being considered "charity cases."

If hospitals utilize some of their internes for out-patient service, it is conceivable that the relief afforded in industrial accident cases is entirely charitable on the part of the hospital that any remuneration available should therefore revert to the institution. This, however, represents the practice of only a small proportion of hospitals maintaining out-patient departments. It is patent that the formulation of a definite policy is essential for the protection of all parties concerned. A consideration of this phase of surgical service merits the attention of the trustees of hospitals and dispensaries in conference with the representatives of the medical staff interested in carrying on the work of the institution.

Some types of epithelioma respond very well to x-ray treatment, but this often fails dismally and it should not be persisted in if results are not soon evident.

Book Reviews

The Journal of Urology. Hugh Hampton Young, Baltimore, Editor. Issued bi-monthly. *Volume 1, Number 1*, February, 1917. Baltimore: Williams & Wilkins Co. $5.00 per volume.

With the appearance of its first number *The Journal of Urology* takes a place among the high-class special medical journals. Conspicuous in the progress of the medical sciences have been the advances in urology. No department of medicine has made more rapid strides than have been accomplished in this field, since cystoscopy and roentgenology have furnished the basis for accurate diagnosis and stimulated the laboratory researches that have gone so far to make urology an exact science. The contributions that marked this development have been scattered through many and various journals. There has grown, therefore, a need for a journal devoted exclusively to urology. In this country the *Urologic and Cutaneous Review*, an excellent journal, has been able only in part to meet the want; it is not devoted exclusively to urology, it has not the space to spare for lengthy research reports, and its purpose is to supply its readers with practical articles rather than academic or purely scientific studies. In French, *Journal d'Urologie*, also an admirable publication, covers the field of surgical urology. *The Journal of Urology* has a wider scope: it will deal with medical and experimental as well as surgical aspects of urology.

In the first issue most of the articles, as might have been expected, are from the Johns Hopkins Hospital. In forthcoming numbers the contributions will probably be more general.

The journal is well printed and richly illustrated. It carries no advertising.

The Surgical Clinics of Chicago. Published bi-monthly. *Volume 1, Number 1*, February, 1917. Philadelphia and London: W. B. Saunders Co., $10.00 per year.

With the passing of the lamented John B. Murphy, there ceased that unique Saunders publication, "Murphy's Clinics," in which were admirably reproduced the always illuminating and usual brilliant clinical demonstrations of that surgical master and teacher. Whether as a substitute or conceived independently, the same publishers are now producing bi-monthly The Surgical Clinics of Chicago, the first number of which appeared in February. Its object is to report and illustrate the clinics of the leading surgeons of Chicago, including the various surgical specialties. About forty surgeons are to be thus represented.

In the first issue, consisting of 221 pages, with 83 illustrations, are reported clinics of Andrews, Carl Beck, Bevan, Eisendrath, Kanavel, Dean Lewis, McArthur, A. J. Ochsner, Phemister, Plummer, Ryerson and Speed. They are all interesting, and several of them convey useful suggestions and novel procedures. For example, Speed demonstrates a new tendon-transplanting operation for drop-wrist; McArthur emphasizes the usefulness of making a bilary fistula, for bile drainage and for introducing drugs and fluids in connection with gastric operations, e. g., to deal with "vicious circle" after gastroenterostomy; Andrews describes a simple procedure in the treatment of web contractures from a burn, to prevent re-formation, etc.

The publication is attractive typographically and pictorially and, we are glad to note, it is of a size to hold in the hand without fatigue.

Certainly, Chicago surgeons are wideawake and progressive. They do not let the grass grow under their feet, and they do not hide their light under a bushel. Their "push" should stimulate to collective activity the surgeons in other large cities.

Progress in Surgery

A Résumé of Recent Literature.

The Removal of Stones from the Kidney. William J. Mayo, *Surgery, Gynecology and Obstetrics,* January, 1917.

There were 450 patients at the Mayo clinic between January 1, 1898, and December 31, 1915, who were operated for kidney stone. There were 484 operations with a mortality of three patients, i. e., 0.6 per cent. The incision used is the lumbar incision, which begins just below the 11th rib near the spinal column and curves downward and forward to within the anterior superior spine with its convexity pointing downward. The cross cut of muscle when properly sutured never results in hernia. The protection against hernia in muscle-splitting operations depends on proper suturing of the aponeurotic covering. Pelviolithotomy is the most generally useful operation for removal of stone in the kidney; in the present series, in 206 cases, the combined pelviolithotomy and nephrolithotomy were done in 34 cases; nephrolithotomy is seldom performed for uncomplicated stones in the pelvis and calyces. Nephrectomy was done in 204 cases. The indication for this operation was the presence of pyonephrosis with stone. The subcapsular method is the method of choice in nephrectomy. The renal vessels are best exposed by further separating the capsule from the sinus of the kidney as it is folded back over the pedicle. In very obese persons or cripples, when the kidney cannot be satisfactorily exposed, Mayo removes enough of the perirenal fat to expose it in situ. Hemorrhage from the renal veins is best secured by fine catgut suturing with a small needle. Even injury to the renal cavity may be controlled in the same manner. When there is serious injury to one of the large renal arteries it is better to remove the kidney. Laceration of pelvis of the kidney is best repaired by making a fatty fascial flap; good union and function result. Injury to the retroperitoneal duodenum is best avoided by using mouse-tooth forceps in grasping bleeding points. Rat-tooth forceps cause serious injury. Where injury to the duodenum has taken place it is best to suture the gut through an anterior abdominal incision.

A Point in the Differential Diagnosis of Pyuria with Remark on Lavage of the Kidney Pelvis. Arthur H. Curtis, *Surgery, Gynecology and Obstetrics,* January, 1917.

In pus infections of the kidney, when urine fails to pass down the ureter catheter the latter is often plugged with material which can then be examined and so lead to the correct diagnosis. When pelvic lavage accomplishes a cure it does it chiefly by dislodging the plug in the ureter. This dislodgment may be brought about by the less dangerous procedure of simple urethral catheterization. When no relief follows catheterization of the ureters it is not to be expected that pelvic lavage will, but such a case eventually requires surgical relief.

The Significance of Bladder Symptoms in the Diagnosis of Renal Disease. A. J. Crowell, *Surgery, Gynecology and Obstetrics,* January, 1917.

Chronic frequency without urethral obstruction, prostatic or seminal vesicle inflammation means renal disease in practically every case. It is by means of close observation of clinical symptoms and by the use of the most approved laboratory methods that we are able to differentiate not only between bladder and kidney lesions but also between the various pathological conditions of the kidney.

Prolapse of the Uterus in Nulliparous Women. Palmer Findley, *American Journal of Obstetrics, etc.,* January, 1917.

Prolapse of the uterus in nulliparæ is rare in comparison to that lesion as found in multiparous women. Virginal prolapse occurs most frequently in the new-born, showing in the most instances other congenital defects, notably spina bifida. In the new-born, the prolapse is not present at first, but develops within a week after birth. The incidence of procidentia associating spina bifida is approximately 86 per cent. Probably the percentage is greater if we were to include cases of spina bifida occulta, a condition which is frequently overlooked. One author, Ebeler, in *x*-raying twenty-eight multiparous women with prolapsus uteri found occult spina befiida in twenty-three (82.14 per cent.). In twenty-eight multiparous women without prolapse Ebeler found spina bifida occulta in only three instances. The defect is in the innervation of the holding and supporting elements of the uterus and vagina, that is, the ligaments, fascia and muscles. Various authors emphasize particular structures as poorly supplied with nerve force. Findley reports two personal cases, one 35 years old, and the other 55 years old, both of whom represent instances of infantilism which he believes to be an underlying factor in the development of procidentia in nulliparous women.

A Study of the Symptoms and Treatment of Congenital Transduodenal Bands. J. Homans, Boston. *Boston Medical and Surgical Journal,* November 9, 1916.

Homans reports the study of 11 cases. These bands are believed to be congenital and extend from various places: from the region of the head of the pancreas, from the gall-bladder or cystic duct, ascending colon, etc. They are not uncommonly found at autopsy in infants and others, and have caused no symptoms. These bands cause a wide variety of symptoms, resembling in many details gastric or duodenal ulcers, cholelithiasis, or chronic appendicitis. A characteristic is chronicity. Homans concludes:

1. Congenital transduodenal bands may be responsible for symptoms "reflex" in type, which have, in spite of considerable divergence, a definite family resemblance.
2. Accompanying these symptoms the Roentgen findings very generally indicate duodenal spasm or dilatation of the first, or first or second, portion of the duodenum.
3. Division of the bands and appropriate treatment of raw surfaces is satisfactorily curative, but plastic operations to widen the opening into the duodenum probably give the best results.
4. Congenital transduodenal bands, judging from the frequency with which they are reported at autopsy, are not necessarily pathologic, but may be responsible for digestive disturbances having a recognizable symptomatology, a prolonged course, and appropriate operative treatment.

The Faucial Tonsils in Singers. Should We Remove Them? Irving W. Voorhees, New York. *New York Medical Journal,* December 16, 1916.

From the answers to a questionnaire Voorhees concludes:

1. An analysis of 5,000 tonsil operations in singers shows that in the hands of skilled operators there need be no special fear of bad results.
2. It is the consensus that bad results are most often due to cicatrical contractions occurring from careless dissection or from neglected aftertreatment.
3. Pain in the tonsillar region, neck and larynx is probably due to section of some of the larger branches of the glossopharyngeal nerve (Justus Matthews).
4. Loss of singing voice after tonsillectomy might be due to a nerve lesion, but is probably due to adhesions and cicatrical formations in the fauces.
5. Loss of singing voice occurs very rarely after tonsillectomy. Impaired voice is possible, but most cases show an increased range of from one-half to a full tone.
6. The singer's problem is a very special one, and no laryngologist should undertake to operate on these patients unless he has some knowledge of the art of singing.
7. At operation the greatest care and skill must be exercised in securing a clean, free dissection. Injury to the tissues surrounding the tonsil may prove disastrous.
8. Post-operative care is of special importance. The patient should be seen daily until full healing occurs.

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[American Journal of Anesthesia and Analgesia]

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SOME THEORETICAL CONSIDERATIONS CONCERNING CHLOROFORM.*

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Chloroform, once the most widely used anesthetic substance, has now been generally discarded in this country, although it is still widely used in Europe. In view of the newer and safer anesthetic methods, such as ether, nitrous oxid, and local anesthesia, there is now little or no justification of its use. Nevertheless, for experimental purposes it is of great interest in providing a means of investigating not only the fundamental question of what the phenomenon of anesthesia is but also the question of the origin of certain changes in the tissues which accompany to a more or less degree the use of every anesthetic agent. It is a consideration of these changes which I wish to dwell upon in this article.

It has long been known that after a prolonged administration of chloroform a condition, often fatal, may manifest itself from one to three days which has been designated as *"Late Chloroform Poisoning."* This condition is characterized clinically chiefly by uncontrollable vomiting, the presence of excessive quantities of acetone, aceto-acetic acid and increase of nitrogen in the urine, marked mental symptoms of drowsiness and coma either with or without preceding delirium, multiple ecchymotic hemorrhages and occasionally icterus. At autopsy edema, fat infiltration of the viscera, multiple hemorrhages and necrosis of the central portion of the liver lobule, are conspicuous features.[1]

There has never been an adequate explanation of these phenomena. Yet such an explanation would be of the utmost importance, since the same changes are found accompanying intoxications with a large number of agents, including other narcotic substances, arsenic, salvarsan, phosphorus and most, if not all, bacterial poisons. It is unnecessary to emphasize the importance of even a partial explanation of not only how the narcotics but also how bacteria produce their poisonous affects.

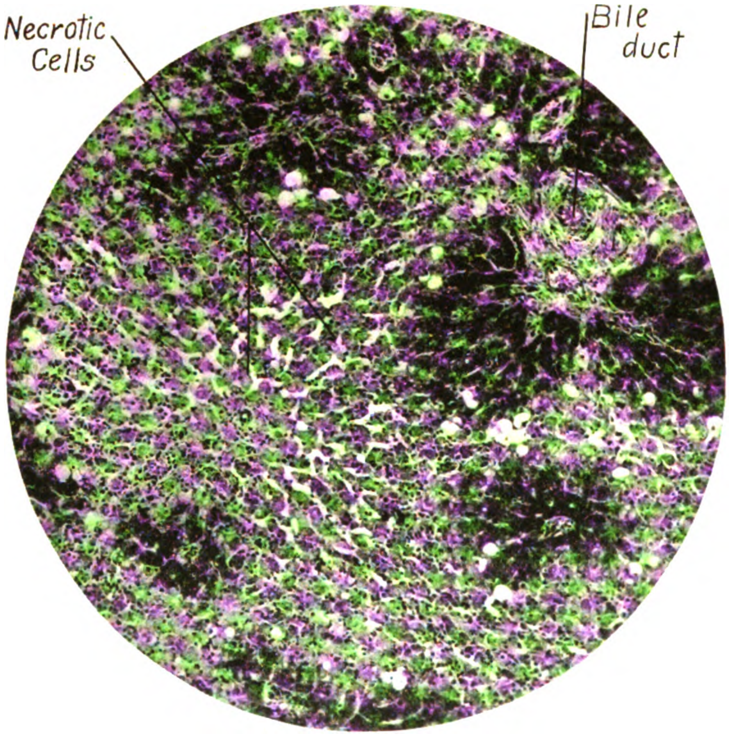

Fig. 1. Typical central liver necrosis produced by chloroform anesthesia for four and one-half hours in Dog B of Experiment 3. Nearly all the lobule is affected. Microphotograph. X 83.

In a recent article[2] the author has shown that at least in the case of chloroform poisoning the evidence is strong that not only the necrosis of the liver but also the fat infiltration, the tendency to the production of hemorrhages and the edema are acid effects. With chloroform the responsibility probably rests chiefly upon hydrochloric acid which is formed during the destruction of chloroform within the body. Similarly, alkyl halides in general not only produce these changes but are also capable of yielding halogen acids (hydrochloric, hydrobromic, hydriodic, as the case may be) in their metabolic break-down. These changes, however, are not limited to intoxications with those substances which can split off mineral acids, but they may follow the administration of any substance that may cause tissue asphyxia with its attendant accumulation of organic acids. Some of the evidence favoring this idea will be presented here, but for most of the details the original article must be consulted.

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*Read during the Joint-Session of the Interstate Association of Anesthetists and the National Dental Association, at Louisville, Ky., July 26-27, 1916.

The fact that these changes are readily obtained with chloroform and only with difficulty by ether suggests that the difference in behavior of the two anesthetic substances must be due either to a difference in molecular action or to a difference in the products formed during their breakdown. Now it is interesting that when chemically pure chloroform is exposed to the sun-light in the presence of oxygen, hydrochloric acid and phosgene are formed, as expressed thus:

$$CHI_3 + \leftrightarrows HCI + COC_2$$

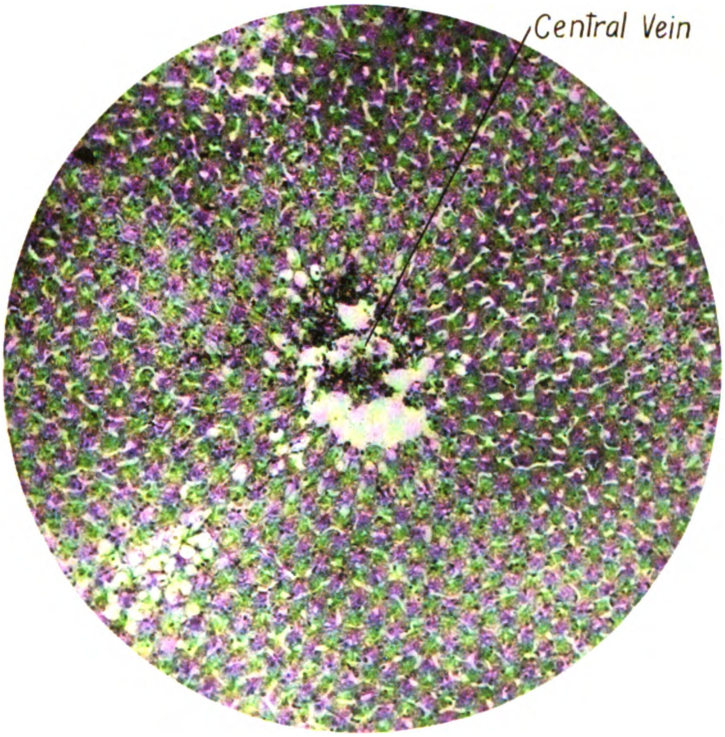


Fig. 2. Inhibition of necrosis by the intravenous injection of 150 cc. of Fischer's alkaline hypertonic salt solution as shown in Dog A of Experiment 3, which had received chloroform for the same length of time as Dog B (Fig. 1). There is practically no necrosis. Only a slight amount of fat accumulation in the cells about the central vein has occurred. Microphotograph. X83.

This oxidation occurs so easily that it has become necessary for manufacturers of chloroform for anesthic purposes to add alcohol to it to prevent decomposition. Phosgene in the presence of water is really decomposed into two molecules of hydrochloric acid and one of carbon dioxid thus:

$$COC_2 + H_2O \leftrightarrows 2HCI + CO_2$$

Therefore it is apparent that for every molecule of chloroform which is oxidized in the presence of water three molecules of hydrochloric acid are formed. Furthermore this decomposition of chloroform is so easily performed that it occurs spontaneously. It is thus reasonable to suppose *a priori* that there is no reason why the decomposition might not occur under the conditions met with in the body, where there is available oxygen and available water. It is not difficult to imagine that the liberation within the body of so strong an acid as hydrochloric might induce severe disturbances.

With these facts and considerations in view, the hypothesis was subjected to a series of experimental tests which may be outlined as follows:

(1) A study was undertaken of the morphological changes induced by hydrochloric acid, with special reference to the liver, since that is the organ which always shows to the most extreme degree the changes mentioned above. (2) Attempts were made to demonstrate free hydrochloric acid in the necrotic areas in the livers of animals poisoned with chloroform. (3) Observations were made on the relative powers to produce these changes of different chlorine substitution products of methane (e.g., dichlormethane ($CH_2\ CI_2$), chloroform ($CHCI_3$), and tetrachlormethane (CCI_4), which on theoretical grounds could be considered to yield different amounts of hydrochloric acid in their breakdown. (4.) The inhibiting effect of alkali was studied. (5.) Attempts were made to produce the typical picture of chloroform poisoning by other alkyl hal-

ides of the same type as chloroform, viz., bromoform ($CHBR_3$), and iodoform (CHI_3), which might be expected to give analogous products in their breakdown, with, however, the liberation of hydrobromic acid and hydriodic acid, respectively, instead of hydrochloric acid. (6.) Experiments were made to ascertain whether or not morphological effects like those produced by chloroform can also be induced by alkyl halides in general, and whether these substances are decomposed in the body in such a way that the corresponding halogen acid is liberated. (7) A comparative study of the lesions produced by chloral hydrate (CCl_3—CHOH) and chloroform ($CHCl_3$) acid in its metabolic breakdown, although it contains the same number of chlorin atoms as chloroform.

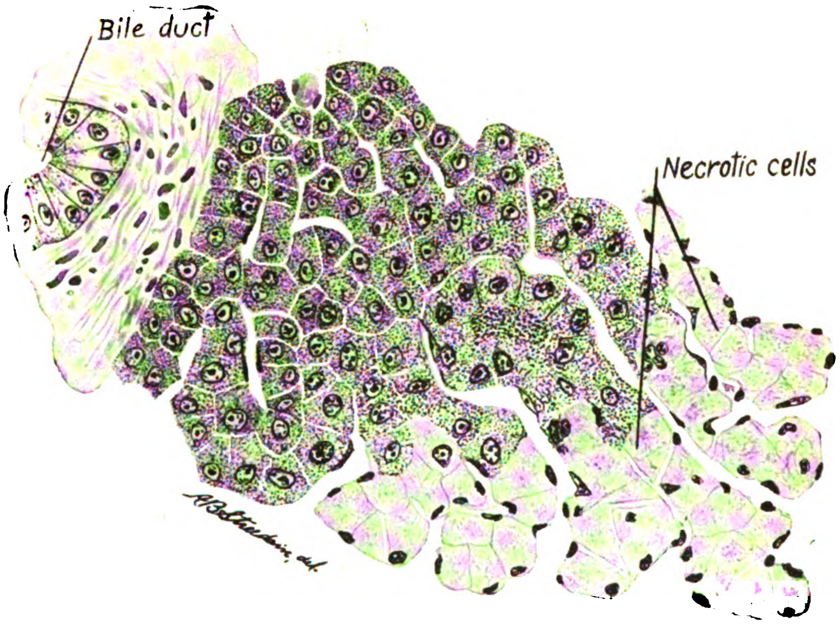


Fig. 3. High power drawing of liver shown in Fig. 1. The necrotic cells in the central portion of the lobule stain intensely with eosin. The nuclei of the parenchymatous cells have disappeared; and only those of the capillaries are evident. X356.

When hydrochloric acid was given in suitable concentration, to rabbits and dogs either by mouth or by injection into a branch of the portal vein it induced all the changes in the liver which are characteristic of chloroform poisoning except that the necrosis was at the peripheries instead of at the centers of the lobules. This difference in location of the necrosis was to be expected by the nature of the experimental conditions, since, owing to the arrangements of the blood supply, the acid entered the lobule at the periphery and therefore exerted its maximum effect at that location. The extensive edema which follows the administration of hydrochloric acid tends to confirm the well known observations of Martin H. Fischer[3] on the imbition of water by tissue colloids under the influence of acids generally. The production of hemorrhages harmonizes with the frequency of their occurrence after tissue asphyxia, with its attendant formation of acid. In a previous paper in which it was shown that the various hemorrhage diseases of the newly born are probably expressions of an asphyxial process, I stated that this hemorrhagic tendency might be due to a "*more fundamental and wide-spread change, as a result of which not only fibrinogen, but innumerable other proteins tend to remain in solution, with the result that apart from diminished blood vessels walls.*" *The production of fatty changes in the liver with hydrochloric acid is in accordance with an observation of Leathes.* It is of great fundamental interest that, as shown here, by the use of a single experimental agent (hydrochloric acid) all those changes in the liver may be produced which are characteristic not only of chloroform poisoning but also of bacterial action and intoxications with many other substances.

Attempts to recognize the presence of free hydrochloric acid in the livers of animals which had been subjected to a deep chloroform poisoning were carried out in the following way: Guinea-pigs which two days previously had been subjected to a deep chloroform anesthesia for about four hours consecutively were anesthetized with ether and while still alive portions of the liver were removed, cut into thin sections very quickly by means of a Valentine knife and immersed in baths of different indicators on the one hand, and in baths of silver nitrate on the other. The only way by which free hydrochloric acid can be detected is by recognizing the presence of free hydrogen ion (H+) and free chlorine ion

(Cl). For the purpose of detecting free hydrogen the best indicator was found to be neutral red; and by means of this, in some of the pigs a hydrogen ion content as high as 10^6 was noted, which greatly exceeds the amount ever reached in the tissues under normal conditions. For detecting free chlorin ion, the method of Macallum and Menten was used of observing the blackening of the sections after treatment with silver nitrate and nitric acid. By means of these two methods it was found that the necrotic areas of the liver lobules contained free hydrogen ion and free chlorin ion. The presumption therefore was strong that these areas contained free hydrochloric acid. These results, however, cannot be considered conclusive evidence of the presence of free hydrochloric acid, since certain other conditions may be present to complicate the results. These are more amply discussed in the original article.

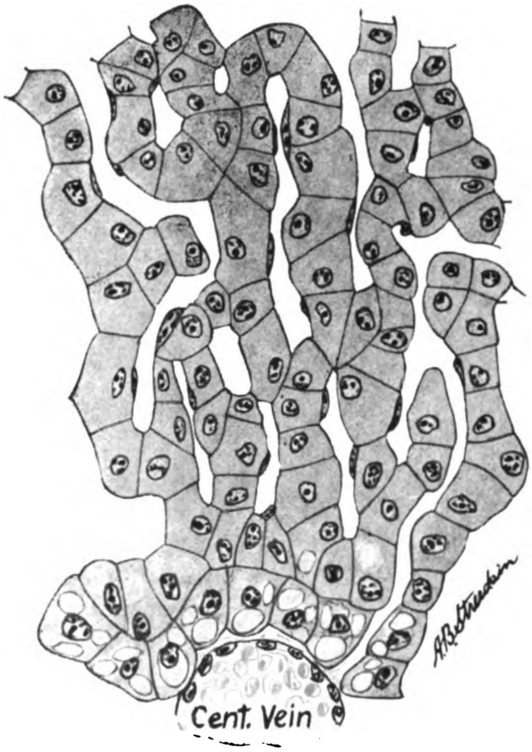


Fig. 4. High power drawing of the liver shown in Fig. 2. There is no appreciable necrosis; and only a moderate accumulation of fat has occurred in the parenchymatous cells around the central vein. X356.

A study of other chlorin substitution products of methane should be of interest from the standpoints of determining (1) whether they all have the power of producing changes in the tissues identical with those of chloroform, and (2) whether this property is proportional to the number of molecules of hydrochloric acid which could theoretically be derived from them. Chloroform, of course, is the tri-chlorin substitution product of methane. If, starting with methane (CH_4), we should outline a series of its various chlorine substitution products, we might expect, according to the theory, that those which could give the largest amounts of hydrochloric acid in their breakdown would manifest the strongest tendencies to produce the necrosis and other changes. Thus *a priori* we might expect the series to run in this order:

$$CH_3Cl+CH_2Cl_2+CHCl_3+CCl_4,$$

If all these substances were equally broken down if all these substances were equally broken down in the body. The last three of the series (viz., CH_2Cl_2, $CHCl_3CCl_4$), were selected experimentally as sufficient to test the tenability of this hypothesis. Outside of the body it had already been known that CCl_4, when heated with water can yield four molecules of hydrochloric acid and CH_2Cl_2 can yield two. That chloroform can yield three molecules of hydrochloric acid in its breakdown has already been shown above. When these various substances were administered to animals by innhalation, it was found that not only did all three possess the power to produce edema, hemorrhages, fatty changes in the organs and central necrosis of the liver, but that this power was shown in greatest degree by tetrachlormethane (CCl_4) and least by dichlormethane (CH_2Cl_2) A comparison of the minimum fatal doses of the three substances when given intravenously to rabbits again bore out the same relationship. The following table shows the minimum fatal doses:

Substance	Minimum fatal doses per kilo. of rabbit.	Minimum fatal doses expressed in gram-molecular contrations.
CCl_4	0.053 gm.	0.000344
$CHCl_3$	0.085 gm.	0.000711
$CH_2 Cl_2$	0.147 gm.	0.00161

Thus it is evident that the power of these various substances to produce the extensive tissue changes paralleled the amounts of hydrochloric acid which they can give in their respective breakdowns outside of the body.

Alkali, if simultaneously administered with chloroform and in suitable concentration, ought to inhibit at least to some extent the production of the various lesions induced by chloroform if they are to be considered as chiefly acid effects. This was found to be the case. When alkali was given intravenously to dogs simultaneously with a protracted chloroform anesthesia, it was found that it protected the dog to a large degree from the production of the changes. Fischer's hypertonic solution of sodium chlorid and sodium carbonate was very efficient in this respect when given in proper concentration. The illustrations show this protective action of the alkali.

Iodoform (CHI_3) and bromoform ($CHBRr_3$), are so similar to chloroform ($CHCl_3$) in chemical structure as to suggest that they might have a similar power to produce the characteristic morphological changes of chloroform poisoning.

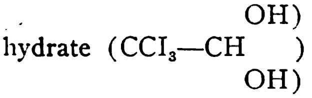
Here, however, we should of course be dealing with an effect of hydriodic and hydrobromic acids, respectively, instead of hydrochloric acid, by the terms of the theory. As a matter of fact, not only do both of these substances induce lesions which are in every way identical with chloroform effects, but it is also possible to obtain some evidence that in each case the respective halogen acid (HBr and HI) is produced in the body. Striking evidence of this is found in the fact that neutral salts of these acids are found in large qaantities in the urine of animals poisoned with bromoform and iodoform. Also by examination of the necrotic areas of the livers of such animals with methods similar to those previously described in connection with chloroform, it was found that these areas contained a large amount of free hydrogen ion and were therefore strongly acid in reaction.

The readiness with which all of the halogen substitution products of methane induced the changes made it seem likely that the same results would follow the use of similar substances of the ethane group. Such was found to be the case with each substance used. The other substances used were ethyl chlorid, ethyl bromid, ethyl iodid and ethylene bromid. Accordingly the results suggest that the power to produce edema, hemorrhages, fatty changes in the viscera and central necrosis of the liver lobules is a property of all those chemical substances which belong in the group of aliphatic alkyl halides. In connection with the theory being developed here, it is very interesting and suggestive that all aliphatic alkyl halides are capable of yielding halogen acids in the test-tube. That they do so also in the body seems to be shown by the fact that after poisoning with all of the substances which were tried, the neutral salts of the respective halogen acids are found in large quantities in the urine. Nef has brought evidence to show that the type of dissociation is as follows:

For chloroform, $CHCl_3 \rightleftarrows \underset{\swarrow\ \searrow}{CCl_2} + HCl$

For ethyl chlorid, $C_2H_5Cl \rightleftarrows \underset{\swarrow\ \searrow}{CH_3CH} + HCl$

Chloral hydrate, although it possesses the same number of chlorin atoms as does chloroform, yet has practically no power to produce these changes. The reason probably lies in the fact that chloral hydrate



$$\left(CCl_3—CH\begin{matrix}OH)\\ \\ OH)\end{matrix}\right)$$

in its breakdown in the body is decomposed into trichlorethylglucuronic acid and therefore is incapable of forming appreciable amounts of hydrochloric acid in contradistinction to chloroform.

Other substances to a less extent have the power of producing the various tissue changes under discussion even although they have no power to yield a halogen acid in their breakdown. One of these substances is ether. But ether, like all anesthetic agents, interferes with the normal exchange of the cell and therefore induces a tissue asphyxia. In any condition of tissue asphyxia, no matter by what means produced, there is an increased production and accumulation of organic acids. Probably, therefore, the syndrome of edema, fatty changes, the tendency to the production of hemorrhages, and necrosis is always an expression of the effect of an acid or of some agent which acts like an acid on the tissues.

BIBLIOGRAPHY.

1. Excellent bibliographies on chloroform poisoning may be found in the following articles: Bevan, A. D. and Favill, H. B., *Jour. Am. Med. Assn.*, 1905. XLV, 691; Wells, H. G., Arch. Int. Med., 1908, I, 589; Whipple, G. H., and Sperry, J. A., Bull. Johns Hopkins Hosp., 1909, XX, 278.
2. Graham, E. A., *Jour. Exper. Md.*, 1915, XXII, 48.
3. "Oedema and Nephritis," John Wiley & Sons, N. Y., 1915.
4. Graham, E. A., *Jour. Exper. Med.*, 1912, XV, 326.
5. "The Fats," London, 1910, III.

CONTROL OF CIRCULATORY DISTURBANCES UNDER ANESTHESIA AND ANALGESIA.*

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INTRODUCTION.—It would hardly seem necessary to mention the importance of carefully watching the pulse changes during anesthesia. But to be told in certain clinics that the practice is to *"disregard the circulation and watch only the respiration"* would indicate that it is necessary to emphasize the importance of watching the circulation. Pulse changes are harder to interpret than respiratory changes and this fact may explain why some so-called *anesthetists* ignore the pulse. To ignore the circulation is to overlook one safeguard in the successful administration of anesthetics. Blood-pressure estimations aid one materially in warning one of approaching shock, and such estimations should be undertaken in most cases.

CAUSES FOR CIRCULATORY DISTURBANCES.

There are numerous predisposing factors in the causation of circulatory phenomena, such as profound anemia, hypertrophied or fatty heart, mental exhaustion, and struggling during induction. Getting at the real causes we may classify them under four headings:

(a) over-dosage of anesthetic agent;
(b) asphyxia (either partial or complete);
(c) shock (either vaso-motor or cardio-inhibitory), and
(d) hemorrhage.

It is vitally necessary to determine definitely the cause for the circulatory disturbances before proper treatment can be applied.

OVER-DOSAGE OF ANESTHETIC AGENT.

Chloroform most assuredly and without warning may cause grave circulatory disturbance. For this reason I have for a number of years practiced continuous auscultation in all of my chloroform cases. I have records of several cases indicating the great value of the phonendoscope in showing the approach of circulatory trouble.

In healthy subjects nitrous oxid will not produce primary circulatory disturbance, but in subjects with valvular or other cardias disease this may occur. Nitrous oxid, if given pure and by a closed method, will rapidly produce anoxemia and secondarily circulatory disturbance.

The plan of administering gas-ether should be relegated to the past and a gas-oxygen-ether sequence substituted. In fact, I believe that nitrous oxid should never be used as an anesthetic unless a sufficient supply of oxygen is on hand.

Ether resembles nitrous oxid in that primary circulatory disturbances never occur when it is used in healthy subjects. In subjects with marked valvular defects, with fatty hearts or with grave myocardial conditions ether may cause circulatory symptoms, but even here the symptoms ordinarily follow slight asphyxia. When respiratory failure occurs under ether the circulation will maintain itself sufficiently long for proper measures to be applied.

ASPHYXIA.

A very frequent cause for circulatory disturbance is asphyxia, and it should be the constant aim of the anesthetist to maintain an open air-way. Artificial air-ways are of great value and should be on hand at all times. Vomiting during induction may tend to produce temporary asphyxia, and when this occurs the plan to follow is to keep the head turned to one side, to retain the mask in position and continue the anesthetic.

Faulty position may contribute to partial asphyxia and this is especially true in operations for laminectomy. Here the anethetist must be constantly on the alert for asphyxial symptoms. The plan I find effective is to elevate one shoulder with pads or with a brace, to lower the head, turning it to the side elevated by the pads.

Very obese patients have an inherent tendency to asphyxia due to the lessened breathing capacity in proportion to body weight. With them my rule is to employ an oxygen-ether anesthesia, which method has proved very satisfactory.

SHOCK.

The exact causation of so-called surgical shock which exhibits itself independently of hemorrhage is still under dispute. We can safely say that in shock we are probably dealing with either a reflex vaso-motor or cardio-inhibitory condition or a combination of the two. Shock may manifest itself as a very transient syncopal condition requiring no treatment or it may occur as a marked circulatory disturbance progressing to a fatal termination.

HEMORRHAGE.

Hemorrhage *per se* must be in considerable amount in the healthy individual to cause any marked circulatory disturbance. In very much weakened individuals or in those too freely purged a far smaller amount of hemorrhage will cause trouble. Today with the technic of the surgeon so near perfection hemorrhage is rarely the cause for circulatory disturbances.

PREVENTIVE MEASURES.

When considering the various factors causing circulatory disturbances it will be noticed that they may almost without exception be termed preventable causes. A careful anesthetist will certainly not err upon the side of over-dosage unless there be an idiosyncrasy on the part of the patient. Further, with chloroform anesthesia particularly and with nitrous oxid and ether to a lesser degree a small preliminary dose of morphin and atropin will lessen the tendency toward circulatory symptoms.

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*Read before the Interstate Association of Anesthetists, Louisville, Ky., July 26, 1916.

Asphyxia is a factor over which the anesthetist must exercise the greatest care. Even a slight degree of cyanosis should not be permitted for any length of time. Under all conditions oxygenation sufficient in degree must be constantly maintained.

In preventing surgical shock the surgeon must contribute his share, which consists in gentle manipulation of the tissues and viscera and in controlling hemorrhage. The anesthetist is often unjustly blamed for circulatory disturbances arising during anesthesia when in reality the surgeon has produced the condition by roughly handling the tissues.

If the patient has been greatly weakened by preoperative conditions such as too free purgation, constant vomiting or hemorrhage, saline, either subcutaneous or intravenous, should be given before the anesthetic is commenced. If the patient is particularly nervous it would perhaps be best to anesthetize first and then immediately begin the saline.

TREATMENT.

When circulatory failure occurs it is practically always secondary to respiratory failure and measures for relief should embody this fact. Given a case of circulatory failure, either partial or complete, the general treatment should be as follows:

(1) Cease the administration of the anesthetic.

(2) Invert the patient by the extreme Trendelenburg position, or in case of children, by grasping the limbs and swinging the head downward. Unless the signs of circulatory failure are very marked inversion of the patient is unnecessary and we need only to practice artificial respiration.

(3) See that an open air-way is present and begin the administration of oxygen. Artificial respiration should also be begun if the respiration has entirely ceased. The introduction of a Hewitt-Ferguson, or Connell air-way will usually insure sufficient breathing space without resorting to traction on the tongue. In the majority of cases the administration of oxygen and practice or artificial respiration is all that is necessary in treating this condition.

When chloroform has been the anesthetic ether may be used subcutaneously as a stimulant. When the circulatory phenomena have disappeared ether may then be substituted for the chloroform.

Strychnin is considered of no value by certain men and lauded by others. Personally I have undoubtedly seen good results follow its use and I should prefer to follow the teachings of Yandell Henderson and use strychnin.

Pituitrin has been recommended and probably does exert a beneficial effect. This has not been tried in a sufficiently large number of cases to determine its exact worth in anesthesia.

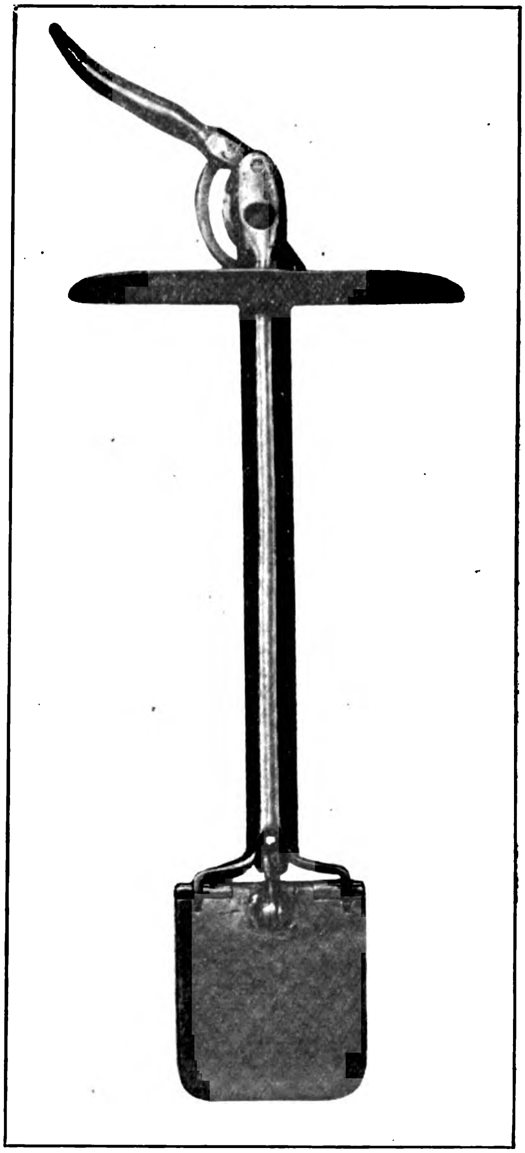

Fig. 1. Instrument for direct massage of the heart, closed for introduction.

In the past when chloroform was the anesthetic epinephrin was recommended as of great value, either subcutaneously or intravenously. The investigations of Levy seem to prove that epinephrin is particularly dangerous in chloroform anesthesia in that it produces auricullar fibillation, which is practically always fatal.

As already mentioned, either intravenous or subcutaneous saline is of no value unless there has been actual loss of body fluids, either pre-operatively or during the procedure. The value of the Hogan gelatine solution must be determined later and I do not believe that one would be justified in administering such a solution at the present time.

It must be remembered that since the circulation is at fault the administration of drugs except in mild cases of circulatory disturbances is absolutely valueless.

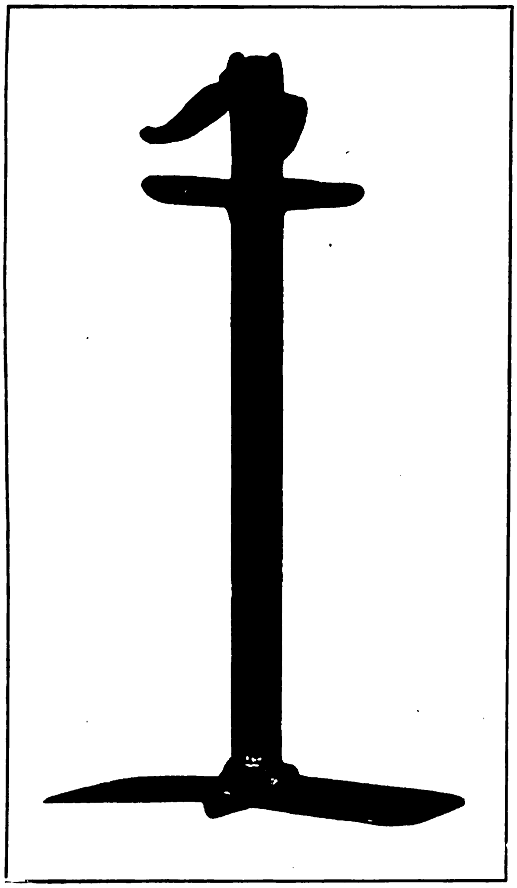

Fig. 2. Same instrument opened for use.

Direct Massage of the Heart.

Should the measures already outlined fail to cause a return of the heart action after four or at the most, five minutes, direct massage of the heart should be practiced. For this purpose we have at our disposal three methods:

(1) Subdiaphragmatic massage of the heart.
(2) Transdiaphragmatic massage.
(3) Direct massage after opening the thorax.

Subdiaphragmatic massage is the easiest method to use, particularly if the operation is an abdominal one. The technic is simple and consists in manipulating the heart through the diaphragm and making rhythmic pressure about seventy times to the minute. There is no danger of pneumothorax which usually follows the thoracic and which also may follow the transdiaphragmatic method. Of the cases recorded in the literature the subdiaphragmatic procedure has been followed by the greatest degree of success.

The method of transdiaphragmatic massage necessitates also that the abdomen be open. The diaphragm is incised a little to the left of the median line and two or three fingers introduced through the opening. The fingers rhythmically press the heart from behind up against the sternum. This method, while apparently better than the subdiaphragmatic, has not been followed by success.

To fully expose the heart by opening the thorax would seem to be the best method, but it has several disadvantages. In the first place the opening must be carefully made and the pleura protected from injury as much as possible. This takes time and each second counts in such cases. Further, unless one is operating by some method which prevents pneumothorax this must be considered. On the whole this method has not been followed by as good results as the subdiaphragmatic, and it is more time-consuming and more likely to be followed by serious consequences. This method, so far as successful results are concerned, occupies a position midway between the subdiaphragmatic and transdiaphragmatic methods.

In addition to the three methods already mentioned for massage of the heart I desire to call your attention to a fourth one—that of instrumental massage. An instrument is employed which consists of two spade-like blades 27 x 25 mm. folded together. A lever controls the blades so that when open they present a flat surface measuring 54 x 25 mm. The total length of the instrument is 20 cm.

In using this instrument the method employed is extremely rapid and simple. A small area over the precordia is painted with iodin. With a knife an incision 3 cm. in length is made over the fifth interspace, slightly to the right of the nipple. This incision extends down through the skin, muscle and pleura hugging the upper border of the rib. The folded instrument is quickly introduced and then extended, thus bringing a flat surface into place for making rhythmic pressure on the heart. Experiments on dogs, which will soon be reported, would seem to indicate that this offers a feasible and very rapid method for massage of the heart. I should not advise the use of this instrument until subdiaphragmatic massage had failed.

Circulatory trouble arises usually when least expected. The anesthetist must therefore not only be prepared for such emergencies, but he must meet them without delay.

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AN EXPERIMENTAL RESEARCH INTO THE NATURE OF NITROUS OXID AND OF ETHER ANESTHESIA, WITH SPECIAL REFERENCE TO: (A) CERTAIN EFFECTS ON THE ORGANS OF THE BODY; (B) CERTAIN RELATIONS TO NORMAL SLEEP; (C) H-ION CONCENTRATION AND (D) INFECTIONS.*

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If we view man and the lower animals as adaptive mechanisms, governed by the universal laws of physics and chemistry, then we must believe that every phase of human or animal behavior is occasioned by and in turn occasions physical and chemical changes in the body. Therefore an understanding of the vast alterations in the behavior of the anesthetized organism—changes which may range from the slightest depression of mental power through progressively deeper stages of unconsciousness to death, necessitates a search for the physical and chemical changes caused by the anesthetic. Accordingly, in this study we shall consider (a) the gross behavior of the anesthetized individual in a consideration of the relation of anesthesia to normal sleep; (b) the influence of ether and of nitrous oxid on the histologic structure of certain organs; (c) the relation of ether and of nitrous oxid to the hydrogen-ion concentration of the blood and to reserve alkalinity; (d) the relation of ether and of nitrous oxid to the infections; and finally, (e) the clinical bearing of these studies.

(A) *The Relation of Inhalation Anesthesia to Normal Sleep.*—The outward similarity in the appearance of sleep and of anesthesia needs no comment. The manner in which a child becomes unconscious under a sufficiently concentrated flow of nitrous oxid over its face closely resembles the manner in which the healthy normal child falls asleep. That sleep is merely the depression of consciousness and that sleep only partially suspends the function of the brain is indicated by slight responses to stimuli, such as the shifting of posture; moving when called or when bright light strikes the eye; the response to tickling, or other reflexes. In other words, the receptors are still active during sleep. The activity of the receptors in anesthesia is evidenced as clearly by the increased pulse and respiration in response to trauma; and, if the anesthesia be light, by increased muscular tone, even by muscular movements. Another similarity is found in the resemblance between dreams during nitrous oxid anesthesia and the dreams of normal sleep.

(B) *The Influence of Ether and Nitrous Oxid on the Histologic Structure of Various Organs.*—As far as nitrous oxid is concerned, here also is found another resemblance to normal sleep. During normal sleep the histologic changes in the brain, the adrenals and the liver due to exertion, emotion, infection and acid injection, are repaired; during nitrous oxid anesthesia also the lesions in the brain cells due to these causes are repaired, and as will be seen later, nitrous oxid exerts a measurably protective action on the adrenals and liver as well. This protective action of nitrous oxid was strikingly demonstrated in a series of experiments on insomnia. A group of rabbits were kept awake continuously for approximately 100 hours. At the end of this period, their brain cells showed the typical physical changes of exhaustion. In another group these changes were partially restored after a single seance of sleep: while in still another group, in which the rabbits were allowed no normal sleep, but were placed under nitrous oxid anesthesia for one hour out of every six during a period of approximately 100 hours, the brain cells, as in the rabbits allowed to sleep, showed marked restoration, some cells indeed being in a *plus normal state.*

A comparative study of the effects of ether and of nitrous oxid was made by keeping dogs under continuous anesthesia for four hours. After four hours continuous ether anesthesia, striking histologic changes were found in the brain, the adrenals and the liver; while after four hours continuous nitrous oxid anesthesia, there were practically no changes in the brain and but slight changes in the liver and adrenals.

(C) *The Relation of Ether and of Nitrous Oxid to the H-ion Concentration of the Blood and to Preserve Alkalinity.*—In a series of H-ion concentration tests made for me by Dr. M. L. Menten, it was found that the H-ion concentration of the blood was increased by ether and by nitrous oxid; that the acidity increased more rapidly under nitrous oxid than under ether, but that the total acidity in either case was proportional to the depth of anesthesia.

In measurements of the reserve alkalinity of the blood made for me by Dr. W. B. Rogers, he found that during anesthesia the reserve alkalinity gradually decreased, the total decrease being greater under ether than under nitrous oxid. He found also that the alkalinity of the spinal fluid and of the bile was altered during anesthesia.

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* Read during the Fourth Annual Meeting of the American Association of Anesthetists, Detroit, Mich., June 12, 1916.

It is significant to note here the fact that the histologic lesions in the brain, the adrenals and the liver, caused by ether and by nitrous oxid, though varying in degree, are identical in kind with those caused by the intravenous injection of acids, as with those resulting from insomnia, exertion, emotion, infection or physical injury.

We must conclude, therefore, that the histologic lesions of inhalation anesthesia are acid lesions; and since acid lesions are restored only during sleep, that the same must be true of the lesions of anesthesia.

As long as fifteen years ago, it was believed that all anesthetics interfered with the use of oxygen, this being the method by which anesthesia was produced. It is true that deep asphyxia may cause anesthesia, but in such asphyxia as is due to obstruction of the larynx, the patient remains conscious and feels pain, though he is markedly cyanotic. While under good inhalation anesthesia, the patient is pink and unconscious. It would seem, therefore, that interference with oxidation alone is an insufficient explanation of anesthesia. On the other hand, the postulate that anesthesia is an induced acidity is not only supported by the laboratory studies we have mentioned, but by the clinical phenomena of anesthesia as well.

It may be in place to refer here to Lillie's notable studies of the mechanism of ether anesthesia. He has demonstrated that the addition of ether to the seawater in which arencola are living caused changes in the semi-permeable membranes, as a result of which these membranes become less permeable to the passage of ions. As life itself is dependent upon the permeability of the cells of the organism to the passage of ions, this action of ether suggests a further explanation of anesthesia, though its application has not been worked out in detail.

(D) *The Relation of Ether and of Nitrous Oxid to the Infections.*—We have already referred to the protective action of nitrous oxid in the presence of the stimuli of continued consciousness as in prolonged insomnia; and other histologic studies have shown that morphin also protects the brain, adrenals and liver from the destructive action of prolonged or intense stimuli. It follows, then, that since the effects of an infection upon the brain, adrenals and liver are identical with the effects of insomnia and emotion, then the administration of nitrous oxid and morphia will in part protect the organism against the damaging effect of infection.

Our experimental findings may be summarized as follows: Nitrous oxid and ether anesthesia alike cause an increase in the H-ion concentration of the blood, the spinal fluid and the bile; and progressively decrease the reserve alkalinity of the blood. Ether causes marked histologic changes in the brain, adrenals and liver, these changes being identical in kind with the histologic lesions caused by acid injection, or activation of any kind. Nitrous oxid and morphia each measurably protect the brain against histologic changes due to infection, while ether increases the damaging effects of infection.

(E) *The Clinical Bearing of These Studies.*—The identity of the phenomena of anesthesia with the succession of clinical symptoms which accompanies an increasing acidosis combined with the fact that the histologic changes produced by nitrous oxid and by ether are identical with those caused by acidosis, supports the postulate that anesthesia is an induced acidity. If the acidity is slight, anesthesia is light and the patient responds to even slight stimulation. As the acidty increases, the anesthesia deepens—first, associative memory is lost, but the cutting of the skin still causes involuntary movements; then muscular tone is lost and even the strong contact stimuli of a surgical operation cannot drive their impulses through the brain to the muscles; and finally, the decreasing alkalinity may so nearly approach the neutral point that even the circulatory and respiratory centers, which are especially adapted to respond to the stimulus of increased H-ion concentration, fail to respond; respiration and circulation are suspended and acid death—*anesthetic death* follows.

These studies explain why a patient, whose reserve alkalinity has been seriously reduced by exertion, emotion or physical injury, or infection; or by reason of starvation, interference with respiration or impairment of the liver or kidneys, is approaching acidosis, and does not take an inhalation anesthetic well; why there is much nausea and slow recovery from anesthesia in some cases and death in others; why children in particular, who are near acidosis, always pass into that state and die unexpectedly.

These facts show how necessary it is for the surgeon and the anesthetist alike to realize that during the operation each is draining the store of reserve alkalinity. If the surgeon employs a local anesthetic, uses gentle manipulation and produces the least possible trauma, he conserves his patient and demands from the anesthetist less of the damaging inhalation anesthetic. The anesthetist in turn conserves the patient by using the lightest possible even anesthesia administered with the least psychic trauma.

These studies show that for the bad risk nitrous oxid anesthesia is to be preferred to ether and that analgesia with local anesthesia should be employed, with general anesthesia only when it is demanded by certain phases of the operation.

These researches suggest the value of a mechanistic view of the phenomena of anesthesia and attach a high importance to the work of the anesthetist.

In my own clinic we have now administered nitrous oxid anesthesia in just under 15,000 cases without a death; and moreover, as our knowledge and experience accumulate, we are able with increasing accuracy to adapt the anesthetic to the individual.

1021 PROSPECT AVENUE.

A STUDY OF THE DISPUTED POINTS IN LOCAL ANESTHESIA.*

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In the discussion of this subject it is my aim to avoid predilections for and prejudices to any drug or method, permitting the drug or technic to stand on its own merits.

Much that I will say can only be verified or disproved in the clinic, the laboratory offering no, or very little opportunity towards a satisfactory solution of certain phases of local anesthesia.

Some time ago Dr. Leo Stern of New York published an article[1] in which he maintained that infiltration anesthesia with novocain suprarenin, resulted in hyperaemia and death of pulps. In another and later publication[2] he elaborates on his first observations and reaches the conclusion that "infiltration anesthesia should *never* be used in the oral cavity".

These are startling case records and necessarily result in a startling conclusion.

It would not be fair to myself if I didn't here, at the outset, reiterate[3] that I personally rarely employ infiltration in my work. And my sole purpose is to learn whether or not it can be employed with safety.

In order to freshen your memory with the controversy that has arisen between Dr. Stern and myself, permit me to briefly quote the substance thereof:

I criticized[3] his advocating the pumping motion—"moving the syringe backward and forward" when performing the maxillary tuberosity and mandibular injections, because this method tunnelled through the tissue unnecessarily and because[3] it would, by repeated jabs, do the things that those who practiced this method wished to avoid. To this, in answer to my criticism[4] he replies that Braun advocates this practice and then quotes Braun as follows:

"To avoid injecting large quantities of the anesthetic into a vein (and thus avoiding toxic effects) the syringe must be in constant motion, injecting during the insertion and withdrawal of the needle."

As is obvious from this quotation, Braun does not advocate pumping, and his fear of injecting directly into a vein is unwarranted, as applies to the dental regions and moreover, such accident is harmless, providing the solution is injected slowly. As a matter of information, I must add that it was Riethmüller who, in October, 1914, first called my attention to the adoption of the pumping motion, but has since concurred in my denunciation of the practice.

Let us now examine the most interesting part of contention, that is, whether or not to employ infiltration.

That thousands of operators throughout the world employ infiltration anesthesia without the above-mentioned sequelae, is a fact too obvious to mention. And I haven't either in print or correspondence been able to find other instances than those Dr. Stern mentions. Desiring, therefore, to test this point of contention in as near a laboratory manner as possible, I hit upon a plan that I think is certain to either commend or condemn it, but of this we shall speak later.

Dr. Stern is of the opinion that the "vaso-constrictor action of suprarenin" plus the "mechanical damage subsequent to the great pressure required to force the solution into deep structure" are to blame for deaths of pulps; to which I must say that by diffusion and not by pressure, does the solution pass through the bone, and as Dzierzawsky has shown, using colored solutions in subperiostial injections, it does not require long for the bone to be permeated, and, however delicate tissue may be, it still has recuperative powers and the action of suprarenin, as will be shown later, appears to have no detrimental effect.

But these again are merely processes of laboratory reasoning. Permit me then to acquaint you with the experiments started.

Realizing that the average clinic is not a suitable place for the results sought, because after infiltration it is rather uncertain as to whether the patient will return at stated intervals for the purpose of ascertaining the vitality of pulps, I asked the first year students of our college to volunteer for infiltration injections just for the experiment. I chose the first year students for an obvious reason, namely: I have recourse to them for at least three years for observation.

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* Read during the Joint Session of the Interstate Association of Anesthetists and the National Dental Association, Louisville, Ky., July 26, 27, 1916.

The injections were all made in the presence of class members (whom on this occasion I wish to sincerely thank) and the technic employed was as follows:

The vitality of the right upper lateral was ascertained and when found devitalized, the left upper lateral was chosen, and in no case did we have to leave these regions. The gum was iodinized and 1½ cc. of a 2 per cent novocain suprarenin solution was injected and the area massaged. In no case has there been a report of trouble, and upon opening of college I shall at intervals re-examine our cases for this report. These experiments are necessarily slow, but we must build on facts.

A very important and probable factor where death of pulps has occurred following infiltration anesthesia, is the injury caused by over-heating with stone or bur. Though the tooth under anesthesia be insensitive to grinding, it should not be subjected to prolonged friction. A stream of water should be directed into the cavity during excavation.

Nor can the fact be entirely overlooked that some teeth we are called upon to treat are, as far as the pulps are concerned, already in a semi-devitalized state, and would, without any sort of an injection, die.

We now come to the very interesting phase of my subject. What is the cause of partial collapse under novocain, the pallor, the trembling, and faintness? Various authors contribute to the causes, but I have never seen any one book or article that lists all of the causes that induce these results.

Thus Dr. Kurt Thoma is certainly in error when he imputes the tremor, pallor, and faintness to suprarenin. And the *T* tablet which he advocates will produce tremors similar to the *E* because it is the novocain and not the suprarenin that is to blame. The solution that we usually employ, is made by dissolving one *E* tablet in 1 cc. of Ringer, the result being a 2 per cent. novocain solution, and the suprarenin in 1 to 20,000 solution. Dr. Thoma would have suprarenin in 1 to 70,000 and therefore be of no practical value. When we realize that physicians daily use a 1 to 1,000 solution (15 drops of same) with impunity, excepting in the aged, it stands as a safe procedure. *Moreover, the most practical test shows that pure novocain or cocain, when applied to an open wound, causes this tremor to appear, yet when suprarenin 1 to 1,000 is applied, this effect is not to be noticed.*

I have injected pure novocain into my forearm subcutaneously with the typical novocain tremor, which, by the way, is preventable, but on injecting 2 cc. of suprarenin solution containing the same amount of the drug that is contained in 2 *E* tablets (viz.: .00010 of a gm.) this effect could not be produced. The reason for this is obvious, when novocain or any other local anaesthetic is injected into the system, part of it immediately enters the circulation and as it passes the cardiac and respiratory brain centers, it effects them just sufficiently to create this flutter, this disturbance.

And now, can this novocain tremor be prevented? Or are we to allow a fear to spread throughout the profession and curtail its use? Already there is spreading a belief that there exists a novocain idiosyncrasy. And there is as much truth to that as there is to the superstition that there exists an idiosyncrasy to cocain. I hope that no one in this intelligent body is of that opinion, neither as concerns novocain or cocain. Certainly no one here believes that when sloughing resulted after some careless pioneer injected a cocain solution that had stood so long on a dusty shelf and had become so mouldy that it seethed with infection. I repeat, no one would credit the drug in this event, nor is it necessary to spend very much time ascertaining the truth of this statement, when you realize that in all the literature you have never heard of a clean cocain preparation ever having effected the most sensitive of tissue—viz., the eye, the urethra. And while on the subject, let me say that were it not for the fact that cocain is habit-forming and can not be sterilized by boiling, it would make an excellent substitute for novocain, in spite of its toxicity. But here you must be able to differentiate between toxicity as refers to the central nervous system, and local destruction of tissue (sloughing). The latter, cocain is incapable of doing, and its toxic effect on the central nervous system can also be prevented by proper care.

I suppose it is needless to state before this audience that in order to obviate tremors, partial faints, pallor and so forth, we must inject very, very slowly, and must have the patient in as near a supine position as is convenient.

The term *slow* is a relative one. Some operators empty a two cc. syringe in the five seconds and think that it is a slow injection. Others double this time and think that it is an exceedingly slow injection. But if you would remember one thing of what I have said, please bear this in mind: *"Take sixty seconds by the clock to empty your syringe, and you will have no untoward experiences to relate."* Dosage matters but little; I have often used more than a tube of *E* tablets in surgical operations on the jaws. Concentration is of more moment than dosage, and even concentration is of less importance than the slowness of injection. In this connection I wish to call your attention to the dangerous maxim promulgated by Seidel at the Muenster Congress where he remarks that "It makes no difference whether a certain dose is injected in weak or strong concentration, as long as the total dose of .2 gm. is not transgressed.[5]" This is certainly dangerous teaching, and even the novice is aware that no local anesthesic is so harmless as to be used irrespective of concentration. A five-grain tablet of Bichloride of Mercury is certainly less toxic in a gallon of water than it would be in an ounce of the same. And so with .2 gm. of novocain.

Position has a great deal to do with prevention of the above mentioned results, and the more erect the patient is sitting, the slower should the injection be executed.

When a patient is in a fainting condition, our first step is to place him in a supine position, so why not approach as near this position as is convenient and obviate chance? You have often heard the expression—"he or she *fell* fainting", but I do not remember hearing of a faint from any cause, while lying down. Attention to these details is productive of uneventful injections and the so-called idiosyncrasies are not to be observed.

FOURTH NATIONAL BANK BLDG.

BIBLIOGRAPHY.

(1) Local Anesthesia in Dentistry, Sept., 1915, Items of Interest.
(2) Dental Cosmos, Jan., 1916.
(3) See my letter in Dec., 1915, Items of Interest.
(4) Dental Items of Interest, Feb., 1916.
(5) Quoted from Thoma's "Oral Anesthesia."

RELATIVE VALUES OF SO-CALLED WARMED AND UNWARMED ETHER VAPOR.*

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In this paper an attempt will be made to summarize the evidence bearing on the use of warmed and unwarmed ether vapor in anesthesia. By unwarmed ether vapor is understood ether vapor which has not been passed through some specially devised heating apparatus before delivery to the patient.

The average temperature beneath the mask when ether is administered by the open drop method is about 32° C—that is, relatively near body temperature. We may therefore eliminate the necessity of any apparatus to warm ether given by the open drop method since the enclosed space in front of the mouth, provided by the cone, forms a natural warming chamber from which the air-ether mixture is delivered into the mouth at a temperature approximating that of the body. McCarthy and Davis have shown that the further increase in heat in such cases is gained by the time the mixture has entered the pharynx, so that the entire warming process is accomplished before the anesthetic enters the respiratory tract proper.

In considering the advisability of warming ether vapor when delivered by other methods, the available data will be presented from the standpoint of safety, efficiency and comfort.

RELATIVE TOXICITY: In 1906 there was published[2] the results of a series of experiments with chloroform vapor on cats from which it was concluded that unwarmed chloroform vapor was 2½ times as toxic as warmed vapor. Since then the same author has investigated the effects of warmed and unwarmed ether vapor and nitrous oxid gas on cats, rabbits and guinea pigs, confirming his belief in the excessive toxicity of unwarmed anesthetic vapors.[3] This conclusion, if correct, would make the use of warmed vapors imperative. On examination of the reports of these experiments, however, it appears that by *toxicity* is meant anesthetizing power; that the same organs are similarly affected by warmed and unwarmed vapor, but that the latter produces its effects more rapidly. Accordingly, if unwarmed vapor is 2½ times as potent as is warmed vapor the anesthetizing and lethal doses of the former should be two-fifths that of the latter. In other words, if anesthesia could be maintained for ten minutes with one ounce of ether in the form of unwarmed vapor it would be necessary to use 2½ ounces of ether during the same time if anesthesia were continued with warmed vapor. There are certain facts which lead us to question the validity of such an assertion. In the first place, certain advocates of the use of warmed vapor have stated that warming the vapor decreases the amount required to maintain anesthesia and that the vapor will act with increased rapidity in proportion to its warmth.[4] Secondly, in a series of experiments on dogs, in which warmed and unwarmed vapor was administered directly into the trachea, we were unable to detect any difference in the quantity of ether required by the one or the other method to induce or maintain anesthesia!

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* Read during the Fourth Annual Meeting of the American Association of Anesthetists, Detroit, Mich., June 12, 1916.

Moreover, anesthetic vapors, regardless of the method of administration, reach the alveoli at body temperature; even the small amount which may be absorbed through the mucous membrane of the nose and throat must be at body temperature when it reaches the capillary walls. When one considers the area of the respiratory surfaces and the mass of the body and circulating blood on the one hand and the mass and volume of anesthetic vapor of low specific heat on the other, it is inconceivable that the anesthetic could go into solution in the blood without instantly attaining body temperature. Therefore, no matter how cold the vapor may be when it enters the mouth, it is at blood temperature when absorbed and carried to the medulla, so that it seems impossible that variations in temperature outside of the body could in any way modify toxicity.

Careful examination of the reports shows a possible source of experimental error which may suffice to explain the findings without assuming a decrease in the toxicity of the vapors when warmed. In his work the investigator used a modified Junker inhaler, which consisted of a rubber bulb by which air was pumped through an ether bottle into a face mask provided with valves. The valves were so arranged that on inspiration the only source of air was the ether bottle, while on expiration the air escaped directly from the mask. Connected directly to the face mask was a very delicate rubber bag which served as an indicator and safety reservoir to prevent negative pressure in the face mask. The object of the experiments was to determine the rate at which animals were anesthetized and killed; in order to be certain that all of the animals received approximately the same volume of anesthetic vapor the latter was pumped into the mask at a rate sufficient to keep the indicator bag two-thirds filled.[14] When the vapor was warmed it tended to expand and the indicator distended proportionately. As the degree of distension of the indicator bag was the criterion of the volume of vapor being administered, any distension beyond the standard would be compensated for by decreasing the rate at which the air was pumped through the ether. It would seem, therefore, that the animals which received unwarmed vapor were anesthetized and killed more quickly than those receiving the warmed vapor, because they were given, not a more toxic, but a more concentrated ether vapor.

In our experiments[1] (mentioned above) the vapor was administered at a rate sufficient to maintain complete surgical anesthesia. By subtracting the number of cubic centimeters of liquid ether remaining in the ether jar from the number there at the beginning of the experiment and dividing the result by the duration of the anesthesia in minutes, it was possible to calculate the average rate at which the anesthetic was required. Thus it was found that the amount of ether required to induce or to continue an already induced anesthesia did not vary when the vapor was delivered alternately unwarmed and warmed, to the same animals. After the first half hour anesthesia was maintained by an approximately 6 per cent ether vapor whether unwarmed or warmed.

We may conclude that there is no satisfactory theoretical or experimental evidence that anesthetic vapors are made less toxic by being warmed; that there is evidence which suggests that warming the vapors makes little difference in the amount required to induce or to maintain anesthesia.

Production of Shock: It has been stated that the energy used in warming ether vapor to body temperature is a considerable factor in the production of post-anesthetic shock. The sources of these deductions have been in the main clinical observations of post-anesthetic convalescence and observations on the fall of temperature during anesthesia.

Post-Anesthetic Convalescence: Clinical observations are necessarily inaccurate because of the accompanying operative procedures and because of inability to properly and uniformly control other sources of heat radiation and use of energy. Some observers have stated that patients anesthetized with unwarmed vapor come from the operating room pallid, drenched in perspiration, vomiting and often in a state bordering on collapse, and imply that such conditions are attributable solely to the refrigerating effect of the anesthetic. In contrast to this is the opinion of observers such as Dr. Isabella Herb, who in a personal experience covering over 30,000 cases anesthetized with an open mask or by unwarmed vapor administered intra-pharyngeally, has found no such alarming conditions due to a well-administered anesthetic per se, even after prolonged anesthesia.[5]

Heat Loss: There is no doubt but that during anesthesia there is a progressive fall in body temperature, nor is there any doubt that the process of warming cold vapor to body temperature abstracts energy from the body. That the total fall in temperature is due to this use of energy is obviously not the case, for the factors of skin radiation and activity of sweat glands are of definitely greater importance in the dissipation of body heat. The question arises as to whether prevention of loss of heat by way of the respiratory tract is necessary or desirable. It has been demonstrated[1] that the coldest ether-vapor-air mixture which is ever likely to be used for anesthetic purposes reaches a temperature of 8.5° C. and that the amount of heat required to raise to 37.5° C., a quantity of such vapor sufficient for an hour's anesthesia is approximately 3.95 Cal. The amount of energy expended in breathing air in an operating room at 27° C. (80° F.) is 1.15 Cal. per hour when no anesthetic is used, so that the increased energy required to breathe ether-vapor-air mixture at its minimum temperature is about 2.80 Cal. per hour. When passed through rubber tubing in a warm operating room the temperature of the vapor as it reaches the patient is considerably higher than 8.5° (at room temperature—Herb) and 1.0 to 1.5 Cal. will usually represent the heat expended in actual practice. Such a heat loss in a 150-lb. man could hardly be detected on a clinical thermometer. Any considerable drop in body temperature must therefore be due to other factors. Davis[6] published the results of clinical observations which seemed to indicate that the use of unwarmed ether vapor was responsible for an average heat loss which would be equivalent to 27.3 Cal. in patients weighing 150 lbs. This is a loss far in excess of what could be accounted for by the use of the coldest vapor one is likely to obtain from any vaporizing machine, so that it would seem that other factors must be responsible for the greater part of this decrease.

In an as yet uncompleted series of observations on dogs the authors have noted that, in a general way, there occurs a tremendous variation in the range of temperature in dogs of the same weight anesthetized under the same conditions, either by the open drop method or with unwarmed or with warmed ether vapor, and have also noted that the fall in temperature in dogs which have been subjected to abdominal section is greater than in those upon whom extra abdominal operations have been performed.

Dr. Isabella C. Herb and Dr. Frances Haines have furnished us with the following data gained from observations on a series of thirty-five patients anesthetized by the open drop method:

Number of patients—
(a) males = 19
(b) females = 16 } Total 35.

Average duration of administration of anesthetic—
(a) males = 35 min.
(b) females = 35 min. } 35 min.

Average fall in temperature—(rectal)—
(a) males = .36° C.
(b) females = .15° C. } .26° C.

Average cone temperature—
(a) males = 31.35° C.
(b) females = 32.2° C. } 31.9° C.

Average room temperature 27.0° C.
Average amount of liquid ether 154.2 cc.
(a) males 183.0 cc
(b) females 120.0 cc

Through the kindness of Miss Emma M. Rohtge, head nurse of the children's department at the Presbyterian Hospital, we are enabled to present the results of a few observations on the changes in body temperature during natural sleep. Observations were made only on children who were without fever and who were otherwise without abnormalities which might be expected to cause variations in temperature. The rectal temperature was taken in the evening in each case just after the child had fallen asleep and again after an interval of two hours without waking the child. In eight of the children, two or three such observations were made in the course of a week; in two there was but one such observation.

Number of children—
(a) male = 5
(b) female = 5 } .10

Average age of children—
(a) male 9.6 years
(b) female 7.2 years } 8.4 years.

Average fall in rectal temperature during two hours of natural sleep—
(a) male .9° F.= .5° C.
(b) female .42° F.=.23° C. } .66° F.=.44° C.

In comparing these two sets of observations two very noticeable similarities appear. First, in each, there is a definite decrease in body temperature following the onset of unconsciousness; second, in each, the decrease in the temperature of the males is more than double that of the females. The fall in the temperature of the children comfortably asleep in bed for two hours is nearly twice that of the patients anesthetized with ether for 35 minutes.

Without entering into an exhaustive exposition of the subject, the evidence suggests that the decrease in body temperature due to etherization is strictly analogous to that occurring in natural sleep; but that it is a purely physiological process, and as such, cannot be regarded as evidence of pathological changes in the tissues.

A difference between natural sleep and sleep due to an anesthetic is that, as a general rule, if the body temperature approaches pathological extremes during natural sleep, the body is irritated even to the point of wakefulness, until protection is obtained, while during an anesthetic sleep, especially deep surgical anesthesia, there is no such mechanism for self-protection, and a dangerous fall in temperature may ensue if the body is not protected by sufficient covering. This does not mean that every avenue for the escape of heat must be shut off, for heat production continues, though at a decreased rate, and hyperthermia with its exhausting influence may be induced.

There have been two deaths attributed to hyperthermia where warmed ether vapor was administered.[3] In each case there had been an operation involving the central nervous system so that the causal relationship of the anesthetic could not be determined, but it seems well to bear in mind that such an occurrence is possible. An anesthetized patient, well covered, will frequently maintain a uniform temperature. If now the only remaining avenue for the escape of heat is closed, and the patient loses the unquestioned stimulating effect of inhaling cool air, hyperthermia may occur, just as insolation occurs to some individuals on oppressive, muggy days in summer when the temperature of the air stays around 38° C. Instances have come to our attention where patients have complained greatly during the induction of anesthesia with warmed vapor because of its oppressiveness and have expressed great relief when the anesthetic was changed to an unwarmed vapor.

Taking the fall in temperature during comfortable, natural sleep as a standard, we have yet to see statistics demonstrating decreases in temperature, said to be due to the use of unwarmed anesthetic vapors, which approach the pathological.

Note has been made of the difference in the degree of the fall in temperature between male and female in the above observations. This, we know, is nothing more than a coincidence; nevertheless, we suggest that we may have here the key to the reported differences in the degree of the fall of body temperature in patients anesthetized with previously warmed ether vapor and in patients anesthetized with ether vapor which has not been so treated.

LOCAL IRRITATION AND CHEST COMPLICATIONS.

This is a subject which is rather difficult to treat satisfactorily because the available data, especially from the clinical side, consists of opinions and not of material which lends itself to critical analysis. The advocates of warmed vapor appear to regard it as a perfect prophylactic in all respiratory disorders incident to inhalation anesthesia. Cough and laryngeal spasm is hardly ever seen.[7] "Dryness of the throat is never complained of unless oxygen has been added." "Cold produces the so-called irritation of ether, contributing to nausea, vomiting and shock, delays the return to nutrition, disturbing the stomach by ingestion of ether-laden secretions, annoys the patient by leaving a lingering after taste on the breath, due to impairment of the eliminative functions of the mucous membranes."[4] In contrast to this, we again call attention to the testimony of Dr. Isabella Herb, who, in her large personal experience, and in a careful study of the work of fellow anesthetists, has failed to find any such disparity as that outlined above.

Graves[8] reported a series of 4,000 consecutive extensive operations under ether administered mostly with a paper cone, the end of which was covered with a few layers of gauze to permit of free passage of air. This series showed 37 chest complications of all sorts, with 2 deaths, a mortality of .05 per cent. and a morbidity of .92 per cent. Risley[9] reported a series of 1,920 similar cases with 27 chest complications and 2 deaths, a morbidity of 1.4 per cent. and a mortality of .1 per cent. In each of these two series 3 cases gave definite physical signs of pulmonary tuberculosis. Munroe,[10] using the open drop method, reported 1,000 cases with 15 chest complications and 2 deaths, a morbidity of 1.5 per cent., mortality of .2 per cent. In Graves series the anesthetic was administered by students under expert supervision; in the other two series by internes. Graves further analyzed a series of 2,000 cases and found that chest complications occurred after laparotomy 10 times as often as after extra abdominal operations of the same duration, and much less commonly after pelvic operations alone than after operations higher in the abdomen. In 920 extra abdominal operations he had only 2 chest complications, one of these in a septic case, a morbidity of .21 per cent. Kronlein[11] reported 1,409 laparotomies etherized by a trained anesthetist by the open drop method, a mortality from chest complications of 0.56 per cent. Gottstein[15] found more respiratory complications following operations under local anesthesia than he did following equally extensive operations under chloroform.

In view of the disproportion in the incidence of chest complications after laparotomies and after septic cases as compared to extra abdominal clean cases, and in view of the chest complications following operations under local anesthesia, it seems open to question whether so-called unwarmed ether, as such, can be made to assume responsibility for them.

The material available from the clinics of the advocates of warmed ether-vapor is not sufficient to permit comparison with the above, though Läwen[12] concluded that the use of warmed vapor does not prevent pneumonia.

Using unwarmed ether intratracheally on dogs, Meltzer[13] did not notice unusual evidences of irritation. McCarty and Davis[1] found no difference in the quantity of saliva and mucous secreted by dogs anesthetized with warmed and with unwarmed ether vapor, nor did they find appreciable differences in the reaction of the respiratory mucous membranes as evidenced by changes visible to the naked eye, or by the course of the convalescence.

There is no proof that the preliminary warming of ether vapor decreases respiratory complications, or that failure to warm the vapor increases them; there is evidence that the procedure does not prevent post-anesthetic pneumonia.

SUMMARY AND CONCLUSION.

There is as yet no proof that warmed air-ether-vapor gives a greater margin of safety in anesthesia than the unwarmed vapor; it may be distinctly dangerous by aiding in the production of hyperthermia.

The assertion that preliminary warming of the vapor decreases pulmonary irritation is open to question.

The warmed vapors do not always add to the comfort of the patient, they may be distinctly uncomfortable.

Gram for gram of ether, there is no difference in the efficiency or toxicity of warmed and unwarmed vapor.

From the standpoint of simplicity and general adaptability, the unwarmed vapor is superior.

BIBLIOGRAPHY.

1. McCarthy and Davis: Annals of Surgery, 1916, lxiii, 305.
2. Gwathmey; Jour. A. M. A., 1906, xlvii, 1361.
3. Gwathmey: Anesthesia, 1914.
4. Hervey: New York Med. Jour., 1913, xcvii, 344.
5. Herb: Jour. A. M. A., 1916, lxvi, 1376.
6. Davis: Johns Hopkins Hospital Bull., 1909, xx, 118.
7. Coburn: Medical Record, 1913, lxxxiii, 382.
8. Graves: Boston Med. and Surg. Jour., 1910, clxiii, 497.
9. Risley: See Graves.
10. Munroe: See Graves.
11. Kronlein: See Graves.
12. Lawen: Muench. Med. Woch., 1911, lviii, 2097.
13. Meltzer: Medical Record, 1910, lxxvii, 477.
14. Gwathmey: Medical Record, 1904, lxvi, 816.
15. Gottstein: Archiv. f. Klin. Chir., 1898, lvii, 409.

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ANESTHETIC RECORDS AND STATISTICS OF ANESTHESIA.*

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> *"Since all phenomena which have been sufficiently examined are found to take place with regularity, each having certain fixed conditions, positive and negative, on the occurrence of which it invariably happens, mankind have been able to ascertain the conditions of the occurrence of many phenomena; and the progress of science mainly consists in ascertaining these conditions."—J. S. Mill.*

IMPORTANCE OF THE SUBJECT.

An accurate system of records is the foundation upon which any scientific work must rest. While some medical problems may be solved by personal judgment, many questions can be answered only from statistics based on careful records. It has frequently happened that one who has an experience of thousands of cases with one anesthetic and who considers this agent free from danger and ideal in every way; as the result of a series of mishaps, suddenly undergoes a diametrical change of opinion. Judgment of the safety of an anesthetic resulting from a study of the statistics of many cases is not liable to such a change.

DIFFICULTIES ENCOUNTERED IN COLLECTING STATISTICS OF ANESTHESIA.

To collect accurate statistics of anesthetic mortality and post-anesthetic complications should be a simple matter. Such statistics should be obtained from vital statistics of communities, from hospital records, and from records of surgeons and anesthetists. Difficulties are encountered in obtaining statistics from each of these sources. It often happens that deaths from anesthetics are not reported as such in the vital statistics of communities. A search of such statistics for known anesthetic deaths finds them frequently falsely reported as due to cardiac failure, uremia, or to the condition for which the operation was indicated. Hospital records are generally so inefficient that the expense of collecting statistics of anesthesia from them is prohibitive. The attempt to collect statistics of the anesthesia in hospitals independently of the hospital record system has always failed. The records of individual anesthetists or surgeons are not usually so kept as to provide accurate statistics. A mass of anesthetic records untabulated or not readily tabulated is of little value. The manner of administrations of any agent can be learned but the percentage of deaths and of post-anesthetic complications could be obtained only at a prohibitive expense. It follows that our knowledge of the results of anesthesia consists of opinions and not facts.

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* Read during the Fourth Annual Meeting of the American Association of Anesthetists, Detroit, Mich., June 12, 1916.

STATISTICS OF ANESTHESIA WHICH HAVE BEEN PUBLISHED.

In spite of these difficulties, statistics of anesthesia which are worthy of study have been published. The most valuable of these have been collected by observers who have reported series of cases and results coming within their personal knowledge.

Neuber[1] collected 71,052 cases of anesthesia with 24 deaths. In 20,613 chloroform cases the mortality was 1 in 2,060; 11,859 ether cases showed a mortality of 1 in 5,930; and 10,230 cases where ether was preceeded by chloroform, a mortality of 1 in 3,410.

Hewitt[2] collected 918,578 cases of chloroform anesthesia with a death rate of 1 in 3,082; and 443,900 ether cases with a mortality of 1 in 14,773.

Gwathmey's[3] notable collection of American Statistics comprises 448,866 cases with 111 deaths. 22,513 chloroform administrations showed a mortality of 1 in 1,608; 294,653 ether cases, 1 in 4,533; while among 14,878 cases of local anesthesia there was no fatality.

Peterka[4] reported 100,971 ethyl chlorid cases with a mortality of 1 in 11,219; McCardie[5], 12,000 cases with a mortality of 1 in 3,000; Hornabrook[6], 18,813 cases with no death; and Ware[7], 15,000 cases without a fatality.

Jones[8] reported 13,000 cases of nitrous oxid oxygen anesthesia with 1 death; Teter[9], 23,952 cases with 1 death; and Crile and Lower[10], 34,964 cases with no fatality.

Teter[11] also collected 934,924 nitrous oxid administrations, 32,172 cases of nitrous oxid and air, and 190,724 nitrous oxid oxygen administrations; a total of 1,161,820 cases with but 2 deaths.

Strauss[12] reported 22,717 cases of spinal anesthesia with a death rate of 1 in 494; Chiene, 12,000 cases with a mortality of 1 in 545; and Violet and Fisher[13], 30,000 cases with a mortality of 1 in 866.

Wood[14] reported 1988 Scopolamin cases with a mortality of 1 in 221.

The writer[15] has collected from sources which seem to be reliable, 2,171,461 cases of anesthesia by various agents and finds a mortality from ether of 1 in 8,010; from chloroform, 1 in 2,605; from ethyl chlorid, 1 in 13,365; from spinal anesthesia, 1 in 515; and from Scopolamin, 1 in 666.

VALUE OF THE PUBLISHED STATISTICS.

While the published statistics do not show the absolute proportion of danger attending anesthesia, they indicate the relative safety of the different anesthetic agents. The statistics show the comparative safety attending the use of ether and nitrous oxid, and the greater danger with which spinal anesthesia and the use of scopolamin are accompanied. The value of the statistics is limited by lack of standards, especially in judgment as to what constitutes a death from an anesthetic. In one series of cases, the influence of the anesthetic in producing a death from shock on the operating table is not questioned, while in another series, a fatality due to suffocation from inspired vomitus is included among the anesthetic deaths. Statistics do not justify the opinion of the Committee on Anesthesia of the American Medical Association; that the use of chloroform should cease, except as a preliminary to ether. For an operation on the pharynx, requiring the use of the cautery, chloroform is probably the safest and most efficient anesthetic that could be chosen. The authority of this committee places the anesthetist who uses chloroform in such a case under a serious handicap. On the other hand, the statistics have proved that the greatest danger from chloroform is in the early stages of its administration and that the use of chloroform preliminary to a safer anesthetic is unjustifiable. In fact, Flemming, after analyzing 700 fatalities under anesthetics which had occurred in Great Britain, advocates ether for induction, even where chloroform must follow.

DUTY OF THE AMERICAN ASSOCIATION OF ANESTHETICS TO COLLECT STATISTICS OF ANESTHESIA.

There is no doubt that the American Association of Anesthetists can in a few years collect statistics of anesthesia of the greatest value. A committee on statistics should be appointed by the association. Statistics should be reported to this committee by members of the association from their own knowledge or observation. In each series, the total number of cases, with the nature of the operations included, and the number of deaths, the cause of death being stated in each case, should be indicated.

STANDARD ANESTHETIC CHART.

The adoption of a standard anesthetic chart by this association will be an important step toward the collection of statistics of anesthesia. The chart should be simple, with the data arranged in the order in which they would naturally be set down. A loose leaf system will be found more convenient than a bound book or a card system. After consultation with a number of members of the association the following chart is recommended. The front of the sheet contains the data in Fig. 1.

On the reverse side of the sheet is a chart for recording by figures, data noted during the anesthesia. The graphic chart in general use is less efficient than the form recommended, the time required to enter data on the graphic chart being about three times that required with the chart recommended.

The data of the chart on the reverse side of the anesthesia sheet are entered as follows:

Hour refers to hour of the day and not to the time of anesthesia.

Note in the first blank column:
  Time anesthesia started by X.
  Time anesthesia established by Y.
  Time operation started by O.

Anesthesia No.
Anesthetic
Date
Time A. M. P. M.
Place
Surgeon
Diagnosis
Patient
Responsible party
Address
Charges
Payment
Age
Previous anesthesia
False teeth
Heart
Lungs
Urine
Medication
Operation
Assistant
Recovery
Remarks

Figure 1. Simple Anesthesia Chart Recommended.

Hour A.M. P.M.	Pulse	Resp.	Pupil	Color	REMARKS
5					
10					
15					
20					
25					
30					
35					
40					
45					
50					
55					
5					
10					
15					
20					
25					
30					
35					
40					
45					
50					
55					
5					
10					
15					
20					
25					
30					
35					
40					
45					
50					
55					

Figure 2. Reverse Side of Anesthesia Chart.

  Time operation completed by C.
  Time recovery commenced by R.
Note in the column designated:
  Pulse rate by figures.
  Respiration rate by figures.
  Pupil, approximate size, 0°.
  Color,
    Normal by N.
    Pale by P.
    Cyanotic by C.
Note under *Remarks*:
  Blood pressure.
  Rash.
  Mucus, if excessive.
  Stimulation.
  Position,
    Dorsal by D.
    Erect by E.
    Trendelenburg by T.
    Lithotomy by L.

Features of the operation affecting the anesthesia. Anesthetists who wish to keep more detailed records than are provided for in this simple chart will find a larger sheet following the plan of the simple sheet, convenient.

The data on the front of this sheet may be arranged as in Fig. 3.

On the reverse side of this sheet is a chart similar to the one illustrated but expanded to provide for entering the systolic and diastolic blood pressure and such other data as the anesthetist wishes to record.

In hospitals having an efficient record system, it is recommended that no independent records of anesthesia be made but that the results of anesthesia be obtained from the hospital record system. Where there is no efficient system of records, the system recommended for private work may be employed.

When the anesthetist employs a card ledger system, the ledger cards may be filed alphabetically and furnish an alphabetical index of his cases.

TABULATION OF REPORTS.

The results of each 100 cases should be tabulated, the tabulation including the nature of the operations, the anesthetics used, the post-operative complications, and the deaths, the cause of death in each case being indicated. The most efficient report consists of a tabulation of each 100 cases of anesthesia with a single agent for a single class of operations.

No. Date
Anesthetic Method
Time A.M. P.M. Place
Surgeon
Diagnosis
Patient
Responsible party
Address Charges
Date of examination
Age Appearance
Previous anesthesia
Dyspnea Edema False teeth
Heart Lungs
B. P. Sys. Dias.
Urine
Medication
Operation
Assistants
Nurse
Consciousness returned
Vomiting, Immediate
  Conscious
  Excessive
Complications
Remarks

Fig. 3.

The results of the tabulation read directly in percentages. A tabulation of any multiple of 100 cases may be readily made from the original tabulations. Tabulation sheets are quadrille ruled. At the left of the sheet are the numbers from 1 to 100 and at the top of the sheet are indicated the data to be tabulated: for example;

Column 1 Case numbers.
Column 2 Operations, Designate.
    Appendix by A.
    Breast amputation by B.
    Gall bladder operation by G.
    Minor operation by M., etc.
Column 3 Handicapped patient designated by X
4 Designate Nitrous Oxide by X
5 Designate Oxygen by X
6 Designate Ether by X
7 Designate Chloroform by X
8 Designate local anesthesia by X
9 Preliminary medication by X
10 Excessive vomiting by X
11 Operative complications by X
12 Circulatory complications by X
    Examples: Embolism, Phlebitis.
13 Respiratory complications by X
14 Urinary complications by X
    Examples: Nephritis, Glycosuria, Acetonuria.
15
16
17 Death by X
18 Anesthetic death by X

Tabulation sheets should be furnished by the association and as many filled sheets as possible returned by each member to the committee on statistics.

STANDARDS TO BE ESTABLISHED.

Certain standards should be determined by this association: for example; what constitutes a surgical operation, whether dental extractions, the application of plaster casts, manipulations done without anesthesia, and dressings done under an anesthetic should be included. It is suggested that a surgical operation shall be considered to be a procedure for which an anesthetic is administered or omitted for cause. A standard should be set for what constitutes a death from an anesthetic. An anesthetic fatality should be suspected when death occurs during the period before consciousness would be expected to return, when a delayed death of the type known to be characteristic of the anesthetic agent occurs, or when a fatality results from the failure of an organ not known to be diseased before the anesthetic was administered.

INTRINSIC VALUE OF ANESTHETIC RECORDS.

The first advantage appreciated by an anesthetist as by an institution which keeps careful records of the results of anesthesia, will be a knowledge of the character of his own work. The ignorance of anesthetists in this respect is not more remarkable than the ignorance of the medical and surgical profession in regard to the results of medical and surgical treatment. Surgeons do not certainly know whether the routine use of the Fowler position has proved advantageous. Neither surgeon nor anesthetist can enlighten a patient who approaches a gall bladder operation as to his chance for developing some pulmonary complication. One states that his anesthesia is perfectly satisfactory, while patients and visitors to the clinic frequently decide that it is not satisfactory at all. One states that by administering oxygen to patients as they recover from the anesthetic he has abolished nausea and vomiting, but nurses who are familiar with the after condition of the patients are frank in saying that the use of oxygen has had no effect in reducing nausea and vomiting. Accurate knowledge of present conditions in anesthesia as in medicine and surgery will lead to greater efficiency in the future.

37 EVERETT AVE.

BIBLIOGRAPHY

1. Mühsam, Med. Klinik, June 16, 1912.
2. Hewitt, Anaesthetics, 1912.
3. Gwathmey, J. A. M. A., Nov. 23, 1912.
4. Peterka, Beit. zur klin. Chir. LXXXI-V.
5. McCardie, British Med. Jour. March 17, 1906.
6. Hornabrook, Australasian Med. Gaz. April 4, 1914.
7. Ware, American Jour. of Surg. July 19, 1915.
8. Jones, Ohio State Med. Jour. August, 1915.
9. Teter, J. A. M. A. Nov. 23, 1912.
10. Crile and Lower, Anoci-Association, 1915.
11. Teter, Dental Cosmos, Sept., 1915.
12. Gwathmey, Anesthesia, 1914.
13. Violet and Fisher, Lyon Chir., Nov., 1910.
14. Wood, American Med. XII, 1906.
15. Miller, American Year Book Anesthesia and Analgesia, 1915.

PRACTICAL METHODS OF ANESTHESIA.*

DR. JAMES T. GWATHMEY,
NEW YORK CITY.

Gentlemen, this is the second time I have had the pleasure of coming before this Association. I remember some years ago the satisfaction and encouragement I received from reading a paper before this body.

The word "practical" in this paper means:

(1) The anesthetic should be suited to the patient and should be modified, or changed entirely, as indicated.

(2) The introduction should be pleasant to the patient, with respiration, blood pressure and color reflex continuing normal.

(3) The maintenance of anesthesia should vary with the surgeon's needs; at the same time the patient's condition should be as nearly normal as possible.

(4) The transition from the anesthetic stage should be as gradual and as smooth as the induction, the patient emerging as from a quiet sleep, without pain, nausea, or conscious or unconscious vomiting.

All of this is accomplished by modern methods, not yet in common use by the excessively utilitarian surgeon employing one method and a nurse anesthetist.

We maintain that *Anesthesia* is a vital part of the practice of medicine, and that the adoption of any one method or anesthetic, regardless of conditions, is contrary to the fundamental principles that should govern all surgical operations and the administration of all drugs. It is most unfortunate for humanity that prominent surgeons have by their *practical* methods decided that anesthesia is *not* a part of the practice of medicine.

When a surgeon assumes responsibility for the narcosis he becomes an *Anesthetist*. It is almost impossible for a surgeon to keep up with the literature of his own specialty. That he is not up to date on this subject is proven by the type of anesthesia witnessed in some of the best known clinics of to-day.

It is begging the question to say that the nurse anesthetist is superior to the average interne. A physician specializing in anesthesia should have control of this department in every large hospital, in every medical college and in every large teaching clinic. It is inexcusable to have nurses in absolute charge of the anesthesia in large teaching clinics.

The nurse anesthetist has proven to be entirely *practical*, but we take it that this Association wants anesthesia discussed under the higher meaning of the word *practical*, and this we propose to do briefly.

PREPARATION OF PATIENT.

In addition to the premiminary narcotic medication to be described the patient should have sodium bicarbonate and lactose, of each one drachm every four hours, for at least 48 hours before the operation. If the urine is already acid, the dose of sodium should be increased; glucose per rectum should also be given after the operation (Buckler).

Bonnot and Cleveland of St. Louis, after using quinin salts in 600 cases, recommend quinin muriate, grains ten, dissolved in two ounces of water at 100 degrees Fahrenheit, to be given immediately after operation; followed in 30 minutes by saline proctolysis or (in septic cases) by six ounces of olive oil. The quinin is repeated every six hours, for four to six doses. It is stated that with this medication *"backache is practically eliminated and only about 2 per cent suffer gas pains."*

PRELIMINARY MEDICATION.

This should vary not only with the patient, but with the individual anesthetist. The consensus of opinion is that nearly every patient should have some form of preliminary medication; otherwise a rise of blood pressure at the very thought of the operation, together with other changes from the normal, prevents the smooth induction, the easy maintenance, and the uneventful recovery that we would otherwise obtain.

In preference to morphin, which sometimes in itself produces nausea, we prefer the following preliminary, which is modified to suit the individual case:

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* Read during the meeting of the Association of Eastern Railroad Surgeons, New York City, 1916.

Paraldehyde
Potassii bromide aa 1 to 2 drams
Aquæ qs. ad. 4 oz.
M. Sig. With patient in Syms position, give per rectum, 40 to 60 minutes before operation.

It has been proven in the laboratory that with this medication: (1) Anesthesia comes on sooner, and less ether is required. (2) The margin of safety is increased, thus making anesthesia a safer procedure.

This medication may possibly have the same effect as Crile seems to have found that morphin has,—*i. e.,* it regulates the acidosis; in fact Crile recommends bromides per rectum for this purpose. Codein may also be used instead of morphin.

Anesthetic Agents.

While morphin has long since been discarded as a general anesthetic, it is well to bear in mind, that in railway emergency work a patient is safer with morphin and alcohol than with either drug alone. Also, that with this combination an analgesic stage comes on before unconsciousness.

For instance, in the amputation of a limb, a tourniquet completes the analgesia long before the alcohol sleep commences.

Chloroform, anesthol and ethyl chlorid are rarely used in this climate as the terminal anesthetic; but as the initiatory agent, or to supplement other anesthetics, they are most useful.

The essence of orange (composed of 25 per cent oil of bitter orange peel, and 75 per cent absolute alcohol) is not in itself an anesthetic; yet its odor, being ten times as penetrating as that of other vapor makes it a safer and better introductory agent to ether by the closed method, than is nitrous oxid.

The physiological basis for the beneficial effect of the oil of orange in the administration of inhalation anesthetics may be found in the prevention of the reflex stimulation of certain sensory nerves by the anesthetic agent. Dastré attributed early syncope to reflex stimulation of the pneumogastric and trigeminal nerves, particularly the sensory branches supplying the nasal mucous membrane and the larynx. Embley has also emphasized the part played by the increased excitability of vagus mechanism, particularly during the early part of the administration. In his inhalation experiments Embley found that failure of respiration is mainly due to fall in blood-pressure. With good blood-pressure, failure of respiration (his experiments concerned chloroform) is practically impossible. Restoration of respiration is dependent upon restoration of blood-pressure. The chances of dangerous vagus inhibition are greatly increased by imperfect respiration.

From these findings it would seem fair to assume that any factor which prevents inhibition of the nervous mechanism of respiration, and which, by its stimulation of the respiratory centre, prevents fall in blood-pressure, will have a beneficial influence upon the course of the anesthesia. The oil of orange seems to exert this beneficial influence by dulling the sense of smell to such an extent that the odor of the anesthetic agent is not noticeable during the administration.

Essence of orange is also useful when ethyl chlorid, chloroform or anesthol are used as the introductory to ether by the open method.

When chloroform is given with the proper apparatus,—in which we have oxygen, air, and rebreathing throughout,—the patient goes under and comes out of the anesthesia as quickly as with nitrous oxid and oxygen and with immunity unimpaired.

In emergency practice when chloroform is used, it is safer and better in every way to surround the mask with paper or a towel and have rebreathing throughout, thus diminishing by one-half or less the amount of the anesthetic used.

Again, dipping the chloroform bottle in a vessel of hot water from time to time, also increases its safety.

Open Drop Ether is a crude, unscientific method of administering this drug. It is responsible for all the ill repute that ether bears to-day, especially as regards nausea and vomiting.

Administered by the best *artist* in the world it is irregular and uneven, with a tendency to acidosis and resultant shock on account of insufficient supply of oxygen.

The administration of nitrous oxid followed by ether, called the *gas-ether sequence,* is an even cruder and more dangerous method than the *open drop.* It raises the blood-pressure enormously, cyanoses the patient, and is responsible for many deaths.

In the light of our present-day knowledge there is no excuse for a continuance of these methods.

The nitrous oxid-oxygen ether sequence by the closed method removes all of the objectionable features of the *gas-ether* sequence, and should be used whenever a closed method is indicated.

The endo-tracheal method introduced by Meltzer has been called the *luxury of breathing,* but the patient can be given this same luxury by the endo-pharyngeal method which is now used by those who formerly employed the Meltzer technic. The same results are secured, however, with the vapor mask which some of us have been using for over ten years.

The *vapor mask* is any chloroform mask covered with gauze and with some suitable arrangement for admitting the warmed oxygen ether vapor.

The ether may be vaporized by any air compressing device, or oxygen may be used from any ordinary low pressure oxygen tank; or the oxygen talk may be filled with air. These methods insure an even ether vapor tension.

If this vapor is passed to the mask just described, it is called open, or, more correctly, a semi-open method; as the mask is usually covered with towels. If the vapor goes to a rubber bag it is called a closed method.

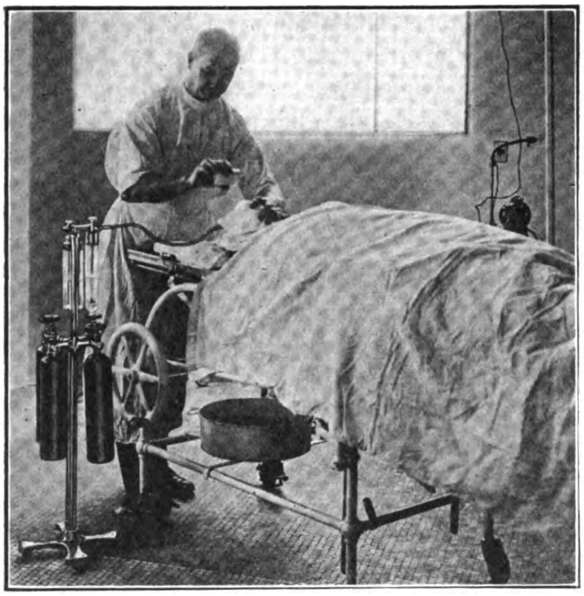
Fig. 1. Open ether method of anesthesia with nitrous oxid-oxygen as a preliminary.

The essence-of-orange ether sequence closed method is one in which a mask and rubber bag is used. The bag is first filled with essence of orange odor and is followed by ether vapor. The patient goes under the anesthetic without change of color and the respiration and pulse normal. An even, deep, safe anesthesia is maintained, and the patient comes out with as little discomfort as follows a good nitrous oxid-oxygen administration. Two and a half ounces per hour is the usual amount of ether used, as against four to eight ounces by the drop method.

The vapor mask, or semi-open method, should be used in operations on the head, neck and upper thorax; the closed method, in abdominal and other operations requiring relaxation.

The so-called gas-oxygen anesthesia supplemented with ether should be used in only selected cases and never as a routine. There is no method known to-day, either local or general, that should be used as a routine procedure.

Oil-ether colonic anesthesia is now a recognized method of administering ether. The patient falls asleep in his own bed, quietly, with pulse and respiration about normal, and the color reflex fully maintained at all times. This method is indicated wherever the element of fear is prominent,—as in goiter cases, or in suspension laryngoscopies, and similar work. It is especially indicated in the obese alcoholic, a class of patients unsuited to any inhalation method. After a personal experience with colonic anesthesia, the writer of this paper prefers it to any other method.

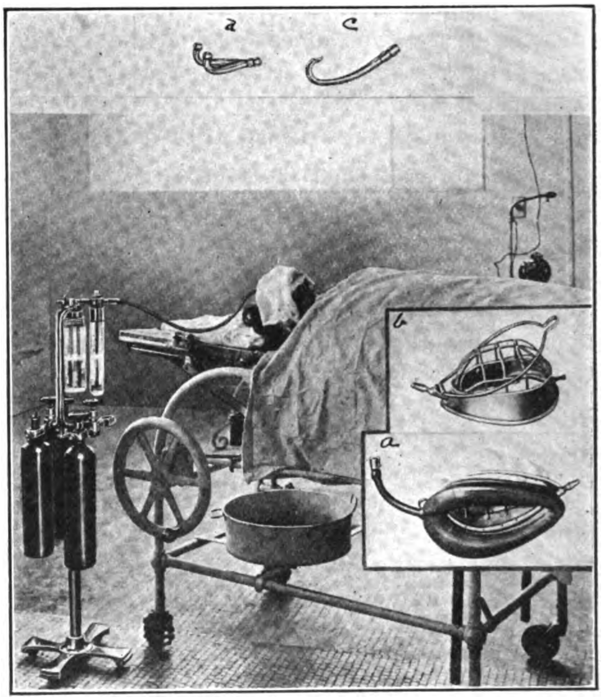

Fig. 2. Details of mask, and oval and nasal attachments.

While the latest available statistics give first place to nitrous oxid and oxygen as regards life, yet so many deaths have been reported from time to time since the more general use of this combination, that we are forced to conclude that it is not so safe as is generally supposed,—that is, with our present methods of administration.

I have therefore devised, and am now using, a semi-open method of administering nitrous oxid-oxygen and warmed ether vapor. This ether-nitrous oxid anesthetic vapor is now warmed.

moistened, oxygenated, and deodorized. Administered in this way the patient does not at any time taste or smell the ether. The mask described is used, the patient getting at all times such an abundance of anesthetic vapors, that there is no strain whatever upon the respiratory center.

Unquestionably the preliminary and after treatment are quite equally as important as the anesthetic or the method of administration. The anesthetist should therefore have entire charge of this treatment, as well as the selection of the anesthetic, if he is to be held responsible for the condition of the patient after the operation. These conditions, granted, it can readily be appreciated that we make no rash promises to any patient in assuring him of a pleasant and safe voyage through the narcotic zone.

40 East 41st St.

THE EYE SIGNS OF NITROUS OXID ANESTHESIA.

A. H. O'Neal, A.M., M.D.,
St. Davids, Pa.

In giving nitrous oxid-oxygen anesthesia the observance of the eye is of equal importance to the pulse, respiration, blood pressure and color of the patient. Indeed, to me it has become a more reliable guide than any of these.

In watching the eye we note as the patient becomes unconscious, its continual oscillation, the contraction of the pupil and the lack of conjunctival anesthesia.

The next change to be noted is the *lack* of oscillation of the eyeball *with* conjunctival anesthesia. The eye muscles relax and the cornea is often seen in a dependent position. Here it is that the operation should be commenced. It is this loss of oscillation and conjunctival anesthesia (because the two are synchronous) which should thus guide us. If anesthesia is deepened the pupil will dilate. If anesthesia is lightened and the pupil still remains dilated and the eyeball oscillates, we have then a condition of shock which will show an oscillating eyeball with a dilated pupil. The operative work should then be temporarily suspended. Before asphyxia occurs to any great extent you will notice the oscillation of the eyeballs ceases, and I think it unquestionably gives us reliable information.

As the zone of operative anesthesia in nitrous oxid is but fleeting and narrow, I offer this sign of the non-oscillating anesthetic eyeball as the most reliable guide in its administration.

Society Proceedings.

Membership in a society devoted to your specialty is an essential to success.

1917 MEETINGS.

The American Association of Anesthetics will meet in New York City, June 2, just previous to the meeting of the American Medical Association. The Scientific Program and Dinner will be held in the Hotel McAlpin. The sessions will take place from 9 to 12 A. M. and 2 to 5 P. M., the banquet following immediately the same evening.

Among the papers already scheduled for the scientific program are the following: President's Address, Walter M. Boothby, Boston; Endopharyndeal vs. Endotracheal Anesthesia in Major Thoracic Surgery, Wm. Banower, New York City.. Ethyl Chloride Anesthesia, Martin M. Ware, New York City; Some Observations on the Scope and Usefulness of Narcoanesthesia, Henry Beates, Jr., Philadelphia; Comparative Studies in Blood Pressure, Albert H. Miller, Providence; Concerning the Effect of Anesthesia on the Blood Volume in its Relation to the Production of Shock, Albert A. Epstein, New York City; Some Observations on Ether-Oil Colonic Anesthesia, Arthur S. Brinkley, Richmond, Va.; Blood-Pressure and Graphic Vacomotor Changes in the Periphery During Ether Anesthesia, W. E. Muns, Columbia, Mo.; Demonstration of an Apparatus for the Determination of the Carbon Dioxid Content of Air and Blood, Yandell Henderson, New Haven, Conn.; and other papers by F. C. Mann, Mayo Clinic, Rochester, Minn.; Carl Henry Davis, Chicago; Charles H. Gallagher, Ithaca, N. Y.; with titles to be announced later.

The first two days of the meeting of the American Medical Association, June 4-5, will be devoted to clinics, during which arrangements have been made for the demonstration of the latest and most improved methods of anesthesia and analgesia. There will also be a Joint-Session with the Sections of Physiology and Pathology and General and Abdominal Surgery, during which several very important papers on anesthesia will be read, among them the following: Shock, F. C. Mann, Rochester; Pathological Pulmonary Changes during Endotracheal Anesthesia for Experimental Lung Surgery, Conrad George, Jr., Ann Arbor, Michigan; Further Observations on the Teaching of Anesthesia in Relation to Surgical Physiology and Pathology, Willis D. Gatch, Indianapolis, Ind.

All those interested in attending the New York meeting should make their hotel reservations at once, and get in touch with Dr. James T. Gwathmey, Secretary, 40 East 41st St., New York City, for further particulars.

The Interstate Association of Anesthetists will meet in Toledo, Ohio, October 9, 10 and 11, in conjunction with the Mississippi Valley Medical Association. Details of this meeting will be published later.

THE LOUISVILLE SOCIETY OF ANESTHETISTS; THE KENTUCKY STATE BOARD OF HEALTH AND THE NURSE-ANESTHETIST.

The Supplement has already published some of the details regarding the preliminary circumstances and events that led up to the filing of the test-suit of *Dr. Louis Frank and Margaret Hatfield vs. the Kentucky State Board of Health* in the Chancery Division of the Jefferson County Circuit Court to determine the legal status of the nurse-anesthetist.

The final agreement in this test-case was for each side to file a single affidavit, each to include affidavits from any source from within or outside the state. The affidavit signed by Dr. A. T. McCormack, Sec'y. of the Board, showed the usual practice with reference to the administration of anesthesia by quoting from affidavits supplied by fourteen of the most prominent surgeons in Louisville. Further it included the results of a canvass of the American College of Surgeons, and affidavits from authoritative

(*Continued on page 61.*)

American Journal of Surgery

QUARTERLY SUPPLEMENT *of* ANESTHESIA *and* ANALGESIA

Surgery Publishing Co.

J. MacDONALD, Jr., M.D., President and Treasurer

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Original Articles, Clinical Reports and Experimental Researches on the Theory and Practice of Anesthesia and Analgesia, as well as pertinent Society Transactions, are solicited for exclusive publication in this Supplement.

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F. HOEFFER McMECHAN, A.M., M.D., *Editor*

Avon Lake, Ohio, U.S.A.

APRIL EDITORIALS. **1917**

THE SCIENCE OF ANESTHESIA AND ANALGESIA.

In the present issue of the Supplement Dr. A. H. Miller makes a plea for accurate anesthetic records on the part of all anesthetists and the compilation of all available statistics by a Committee of the Organized Anesthetists. Such records and such statistics would serve a very definite purpose and would also result in disposing of many unwarranted clinical and empirical opinions, now held to the detriment of progress.

While standardized records would facilitate the compilation of statistics, at the same time such records would not always lend themselves to a solution of certain problems. Consequently, it is very desirable that even in keeping such routine records that the anesthetist should set himself to a more painstaking study of some definite and restricted and mooted question in the science or practice of anesthesia and analgesia.

In this way the individual anesthetist will accumulate protocols and records that will add something of definite value to the sum total of the science of anesthesia. The whole field of anesthesia and analgesia is wide open for review. Controversy, even thought it may become more or less polemic, makes a good clearing house for ideas. More attention to the physio-pathological phases of anesthesia and analgesia will redound to the benefit of all concerned. Johns Hopkins, Rush and the University of Indiana have shown conclusively that internes, under supervising anesthetists, can be successfully set to the investigation of certain scientific aspects of anesthesia, and the custom so pertinently set, should be followed more universally. Those who investigate such problems acquire the scientific spirit and habit, and become all the more valuable members of the profession, irrespective of what specialty they finally elect to pursue.—McM.

THE NURSE ANESTHETIST—CONTINUED.

In Ohio the efforts of the exponents of the nurse anesthetist to initiate a legislative amendment to legalize the nurse anesthetist have, so far, come to naught. The effort aroused the resentment of both the medical and dental professions. This agitation on the part of the nurse-anesthetist proponents also resulted in the chiropractors appearing before the Ohio State Medical Board and making a demand to be allowed to administer anesthesia for minor surgery and obstetrics.

In Pennsylvania the Bureau of Medical Education and Licensure, after considerable prodding, finally secured an opinion from the Deputy Attorney General, which held that nurses properly trained in anesthesia could legally administer anesthesia under the supervision of a licensed physician. Dr. J. M. Baldy has also announced, unofficially, that any medical man can take up residence in Pennsylvania and adminster anesthesia, under the supervision of a licensed physician, without complying with the usual requirements for reciprocity. This indicates the length to which the Pennsylvania Bureau is ready to go to support its subsidizing of the nurse anesthetist. The Bureau has been requested to give an official statement on the standards it has set for determining what constitutes proper training in anesthesia for nurses, but so far has not answered.

In Kentucky the Louisville surgeon who refused to abide by the opinion of the Attorney General and the decision of the Kentucky State Medical Association that the nurse anesthetist was illegal and unethical, has been accommodated with a test-case by the State Board of Health of Kentucky, which was decided in favor of the defendants by an opinion handed down by Judge Kirby of the Jefferson Circuit Court, March 10, upholding every point made by the State Board against the nurse-anesthetist. If necessary the case will now be taken to the Court of Appeals by the Attorney General for ratification.

It is interesting to note that both the Journals of the Indiana and Tennessee State Medical Associations have printed editorials discountenancing the nurse anesthetist. Further developments will be awaited with interest.—McM.

Newer Apparatus

Editor's Note: From time to time this Department will publish Illustrations and Technical Details of the Newer Apparatus for Anesthesia and Analgesia.

A NEW NITROUS OXID-OXYGEN-ETHER APPARATUS.*

Karl Connell, M. D.

Assistant Surgeon to Roosevelt Hospital; Associate in Surgery, College of Physicians and Surgeons.

New York City.

It is an honor for a surgeon to be invited to demonstrate his apparatus before the New York Society of Anesthetists.

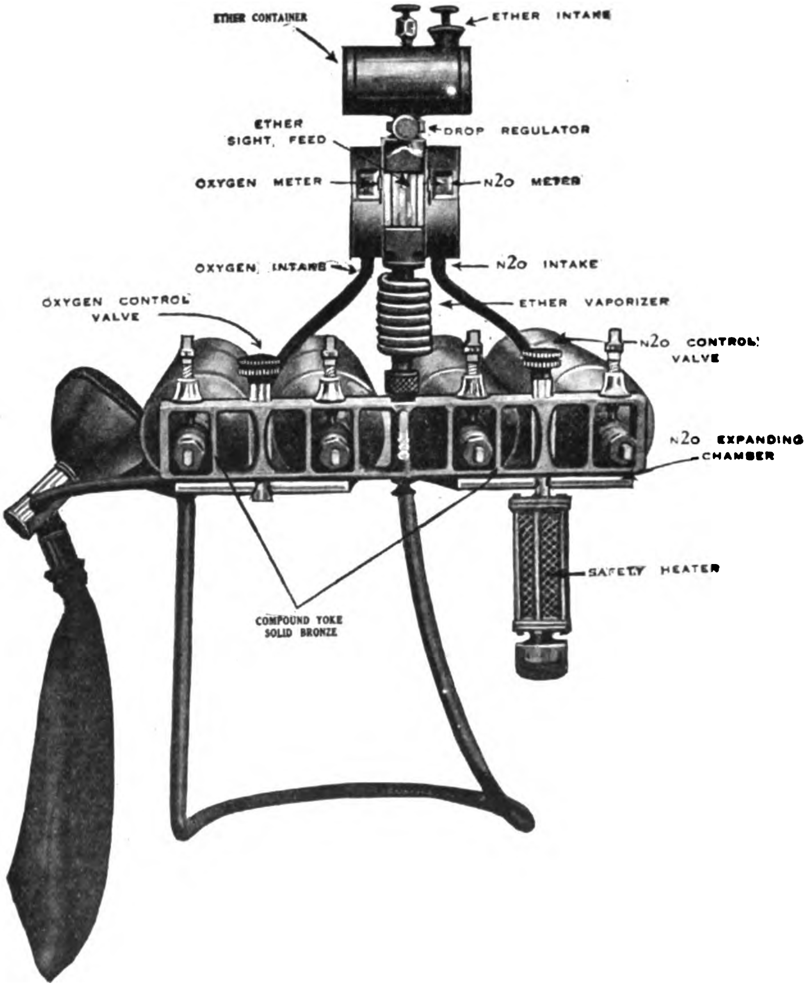

Fig. 1. Connell nitrous oxid-oxygen-ether apparatus assembled for use. Close-up of apparatus, showing the various details of construction and control.

Being afflicted by an inventive turn of mind, the field of mechanical aid to the administration of anesthetics has been a tempting one to dabble in, and since gases and vapors have not received the same mechanical measurement of dosage as have strychnin and morphin, I have invaded the field of ether administration in exact vapor tension dosage by devising the anesthetometer.

For five years past I have endeavored to build a gas oxygen apparatus that would enable one to obtain continuous control and knowledge over the flow of these gases.

The attachment to the anesthetometer which I demonstrated four years ago before this society, while yielding much valuable data on quantity and percentage of gas flow, has proved impracticable, as the ratio of the gases could not be rapidly changed, so experimentation along this line was abandoned. The method of sight feed through water, devised by Boothby, was experimented with when it first appeared, but attempt at measurement by the bubbling of gases from the open end of submerged tubes or through submerged slits and graduated holes submerged in water, glycerin, oil, and other media proved personally unsatisfactory, and because of the disadvantages of the bulk and splash of the liquid I ceased experimenting with this method after a few months.

At the Roosevelt Hospital for three years our anesthetists have used a miniature gas-oxygen apparatus weighing about one pound, which I devised. It depended for measurement of gases on a loose piston riding upward by gas pressure in a cylinder, and uncovering a calibrated slit for gas escapement, indicating by its upward excursion the gas flow with fair accuracy. The disadvantage of this piston apparatus was that the piston would at times stick in the cylinder, and several times we have presumed that the patient was getting oxygen when in fact the tank had run empty.

I searched the various loose piston devices in the United States patent office and concluded that none of these were sufficiently accurate and sensitive and at the same time reliable. I, therefore, turned for use in oxyacetylene blow torch, and elsewhere, to the idea of an unbalanced vane, substantially a disk, on the periphery of which gas impinges, actuating the disk against the force of gravity. By riding the disk on fine gold pinions in ruby jewel bearings, minute variations to the fraction of a teaspoonful of gas per minute were thus obtainable. On the periphery of this disk, a scale was mounted visible through a glass window in the housing and indicating the rate of gas flow much the same as the speedometer in your car indicates by figures on a disk how fast the car is going. The oxygen disk in the apparatus I exhibit, is calibrated to a flow in steps of one-tenth liter per minute from two-tenths to two and five-tenths liters per minute. The nitrous oxide disk is calibrated in steps of one liter per minute from two up to twelve liters per minute.

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* Presented at the meeting of the New York Society of Anesthetists, February 28, 1917.

The reason for this range of calibration is as follows: It is found in practice that the average human subject became asphyxiated on an oxygen flow of less than five-tenths of a liter per minute, or, as you are more accustomed to express it, on a flow rated at seven and one-half gallons per hour. Indeed, even during induction it is found in practice that a continuous flow of eight-tenths of a liter per minute must be maintained. When symptoms of oxygen deprivation appear, the oxygen is gradually increased until the wants of that individual are satisfied. Usually this requires within the first fifteen minutes of administration, a flow of about one and two-tenths liters per minute. Later the flow may be increased to one and four-tenths or one and six-tenths liters per minute. Rarely does the flow have to be as rapid as two liters per minute, and then only in pathological states such as anemia, sepsis, and obstruction. Any larger volume, however, can be thrown through the meter, it merely ceases to register when the two and five-tenths liter mark has been passed.

Each meter, as you see, is about the size of a large watch. They could be made as fine as a lady's watch; in fact the first models were, but this necessitated a scale so fine in graduation as to be impracticable.

The nitrous oxid meter is also calibrated through a range of useful measurement for that gas, namely: It is found in practice when less than five liters per minute is administered, that the retention of carbon dioxid and other waste products becomes noxious, that the patient breathes excessively in depth and rate, the blood pressure rises and poor anesthesia is maintained, whereas, on a flow of from six to ten liters a minute, or ninety to one hundred and fifty gallons per hour, the breathing remains regular, full, and normal. The latter dosage has no physiological disadvantage, yet when one passes the eight liter mark, it is found that the quantity of oxygen must be proportionately raised, else the oxygen content in the tidal gases of respiration will become so impoverished that asphyxia becomes evident. Since the larger flow of gases possesses no physiological advantage except as it excludes inert nitrogen from a leaky face mask, it is found that the ideal flow of gas, considered from a combined standpoint of physiological and financial advantage, is a total gas flow of about seven liters per minute, of which oxygen constitutes eight-tenths to one and four-tenths liters per minute. When mixed by continuous flow with the tidal gases this yields the desired eight to fourteen per cent. of oxygen in the tidal intake.

The other features of the apparatus which I present have been gone into with equal care. The yoke presented tonight for the portable model, binds four tanks, two of gas and two of oxygen, into a solid unit. The tanks lie flat on their side on a chair, for example, or a table, in preference to the flimsy portable stand so often carried. The yoke is made of a solid phospho bronze casting. It weighs four pounds and is designed to stand a strain, at each yoke head, of six tons, which is more than it is possible to obtain by the screw device fastening the steel gas tanks in place. The control valves are seated in the bronze yoke and are adjustable with a thumb and forefinger, and the meters note the response to the various manipulations. Reducing valves of the spring type have been eliminated from this apparatus. The above plain pin valves have been adopted as more advantageous.

The pin valves for smooth continuous flow of the nitrous oxid must be kept slightly warm, otherwise this gas freezes and sputters. No extra heat at the oxygen valve is needed. Heat is added to the bronze expanded chamber tooled in the yoke and to the pin valve by an alcohol lamp, adopted as safer, more convenient, more reliable, and more efficient as a source of heat, than electric heaters. Most of the recorded accidents of inflaming ether vapor by mishaps to anesthetic devices have been caused by the spark of electric connections, and you well know the troubles of burned out connections. This lamp is a modified miniature miner's safety lamp. It is not possible to ignite from this lamp such combustible substances as ether, benzine, or illuminating gas. This I illustrate by pouring a teaspoonful of ether over the ignited and heated lamp. The ether does not ignite and the flame within the lamp merely flickers. I pour several ounces of ether over the lamp and instead of conflagration, the flame is extinguished because the combustion mixture within the lamp has become too rich and the flame cannot project itself outside the wire gauge. Thus we have a safe and reliable heating device. The novel feature of this lamp is the copper conductor of heat whereby the minimum of flame yields direct to the yoke the maximum of heat.

As a final feature of the apparatus, I desire to demonstrate the ether mixing device. Ether is fed into the gas mixture when desired by the drop method. I have found that the addition of ether by the method of shunting the gases through or over liquid ether has many disadvantages. As Boothby has shown, the amount of ether taken up by this process can neither be approximated nor regulated to within fifty per cent., and may vary widely at times, nor can the same concentration be maintained evenly since the ether is subject to certain rigid vapor tension laws; and the tension differs so widely with variations of temperature due to refrigeration. The drop method, on the other hand, is visible, and while censured because the drop as ordinarily done from a crude oil cup, does not stay evenly at a given rate, yet this method, when refined, offers a fairly stable and accurate basis for the calculation of the vapor concentration delivered. The ether dropper in this apparatus has been made smooth and regular by mechanically correcting the control pin, from the type accustomed to handle oil and by the employment of a horizontally placed tank, thus avoiding marked diminution in the vertical head of liquid as it becomes consumed. The liquid ether drops from a standardized ball tip through a sight feed into a spiral coil when the ether is vaporized into the gases. While this fine coil looks like a toy, being only an inch in diameter and two inches long, yet it contains eighteen square inches of radiating surface and has capacity to vaporize 180 mm. of ether vapor by tension into a gas flow of eighteen liters per minute. Since 80 mm. of ether vapor tension is the maximum one required for induction of ether relaxation when superimposed on nitrous oxid-oxygen anesthesia, this coil possesses an excess capacity of about four hundred per cent. From the coil the gases and vaporized ether flow into the yoke when they are warmed for delivery to the patient. This warming is for sentiment, not that it possesses any demonstrable advantage.

The apparatus as a whole weighs about seven pounds, and as you note, I brought the three parts to this meeting in my hip pockets.

The mask possesses novel features only in being a very carefully modeled anatomical fit, with suction type joint, and in possessing a spill calibrated for continuous outflow in liters per minute.

I present the entire apparatus with a certain pride of achievement, for the aid of accurate measurement and control over the dosage of these intangible anesthetic agents has already, at the Roosevelt Hospital with the first rough model, enabled us to direct the novice anesthetist as to limits of dosage, and has enabled him to obtain, on the first trial, a perfection of anesthetic control hitherto achieved only by highly trained expert.

ROOSEVELT HOSPITAL.

THE AMERICAN ASSOCIATION OF ANESTHETISTS WILL MEET IN NEW YORK CITY, JUNE 2, 1917 AT THE HOTEL McALPIN FOR ITS SCIENTIFIC SESSION AND ANNUAL BANQUET. CLINICS WILL BE HELD JUNE 4-5, IN CONJUNCTION WITH THE AMERICAN MEDICAL ASSOCIATION.

Society Proceedings

(*Continued from page* 57.)

sources throughout the United States. Arguments were included to show why a knowledge of medicine was necessary in order to properly and safely administer anesthetics.

While this first affidavit seemed sufficient to meet and refute the original affidavit of the plaintiffs, a few days before the hearing, the plaintiffs filed a supplementary affidavit, alleging that "In Kentucky, a number of public and private hospitals, anesthetics are administered by trained nurses; that this is true of the Norton Memorial Infirmary and the Children's Free Hospital, Louisville; Spner's Hospital, Dayton; Illinois Central Hospital, Paducah; St. Joseph's and Good Samaritan Hospitals, Lexington, and it is not a fact that the practice has been abandoned in such hospitals. In addition anesthetics have been administered by a trained nurse in the Jewish Hospital, St. Joseph's. and at St. Mary's and St. Elizabeth's Hospitals, Louisville. In the Louisville City Hospital, which is very much the largest in the state, anesthetics, in practically all surgical cases are administered by internes, who are not licensed physicians, and it is the usual and daily practice for medical students who are not licensed, to administer anesthetics."

Other statements were included in the plaintiff's supplementary petition to discredit that of the State Board, and the paper, read by Dr. J. M. Baldy of Philadelphia at the meeting of the American Gynecological Society, was incorporated in full. The plaintiffs also alleged that no deaths had ever been heard of as occuring while a nurse was the anesthetist, while many deaths were on record while physicians were the anesthetists.

In answer to this supplementary affidavit, the State Board secured affidavits from two resident physicians of St. Joheph's Hospital, the present and former one, stating that in only two instances during the past two years had anesthetics been administered by anyone except physicians and that in the two instances mentioned, the plaintiffs themselves were the operator and anesthetist. An affidavit was also obtained from Dr. Fowler, Supt. of the Louisville City Hospital, who stated that: "Anesthetics are always administered either by one of the resident physicians, all of whom are graduates of 'Class A' medical colleges, or by one of the members of the visiting staff of anesthetists. . . Members of the Junior and Senior classes are permitted to witness operations and make observations, but never has a medical student or a nurse administered a general anesthetic, at the Louisville City Hospital."

Dr. Horine also submitted an affidavit stating that he was familiar with the work done at the Louisville, Jewish, St. Anthony's, Deaconess', St. Mary's and St. Elizabeth's, Children's and Norton Hospitals, and that physicians were always the anesthetists, except in the cases operated on by the plaintiffs. A statement was also secured from a young physician, who had just returned from three years' service at the Mayo Clinic, where he had witnessed two deaths, while nurses were administering anesthesia, and other fatalities of a similar character were submitted.

The supplementary affidavit submitted by the State Board thus refuted that of the plaintiffs in every detail.

The hearing of the test-case was before Judge Samuel B. Kirby, in the Chancery Division of the Jefferson Circuit Court, Louisville, February 17, and lasted a little over two hours. The two affidavits were filed with the briefs and then the Judge requested an oral statement from both sides. The attorney representing the plaintiffs attempted to inject the Organized Anesthetists into the matter by saying that they desired to create a monopoly, but Judge Kirby very courteously advised him that this attack was irrelevant and without bearing in the case at bar. The attorney for the State Board based his argument mainly on the legal questions involved. The Judge then took the case under advisement and delivered his opinion on March 10, holding that: "The trained nurse, (in administering anesthesia) is performing the function of a physician and in the language of the statute is discharging the duties usually performed by a physician." The Judge admitted that the nurse in this instance was trained, but "as contended by the defendant, if she be allowed to perform this service without having complied with the law, any other trained nurse, who has not her skill or ability or training or other qualifications and however ignorant, may perform similar service. . . It is the example, which the State Board of Health is objecting to."

There is every prospect that the test-case will now be taken to the Supreme Court, (Court of Appeals), for final adjudicating. In this event, the Attorney General of Kentucky, the Hon. M. M. Logan, is prepared to present a far stronger argument for the State Board, than was presented at the first hearing, with the additional backing of some of the highest medical and educational authority.

It is to be hoped that this favorable decision in Kentucky will enable State Boards in other states to put a stop to the activities of certain surgeons and hospitals in attempting the disintegration of the practice of medicine to the detriment of public health and safety.

APOTHESINE, A NEW LOCAL ANESTHETIC.

Carroll W. Allen, M. D.

New Orleans, La.

It it with much pleasure that we note an effort on the part of our chemical manufacturers to provide us with drugs, the original products of their own laboratories and make us independent of foreign sources, which have so long been our only source of supply. Apothesine, recently presented in experimental quantities by Parke Davis & Co., is a synthetic product of their laboratory. Chemically, it is the cinnamic ester of grammadiethylamino propyl alcohol hydrochlorid. Apothesine occurs in the form of small snow-white crystals, having a melting point of approximately 137° C. It is easily soluble in alcohol; very soluble in water; and slightly soluble in acetone and ether.

During a clinical experience of several months, I have been very favorably impressed with the anesthetic properties of this product and have performed hernia, hemorrhoid, fistula, varicocele, circumcision and plastic operations. I have uniformly used a ½ per cent. solution in 4 per cent. sodium chlorid with five drops of adrenalin chlorid solution, 1 to 1000 to each ounce. The anesthesia has been complete in all cases and has invariably lasted in excess of an hour. No immediate or late irritating effect was noted and the wounds healed as well as after the use of any other anesthetic solution. No toxic or other unpleasant immediate or after effects were noted, although large quantities were purposely used to determine this point; as much as four ounces in one case, which represented nearly ten grains of the drug. This limited experience, with the absence of other data, is not sufficient to give it its proper place among local anesthetic agents. Data regarding its toxicity are not obtainable, but from my experience it must be very low. In this connection, the manufacturers state that its toxicity is not greater than that of novocain and considerably less than that of other anesthetics commonly employed.

I have not been able to obtain any more exact information than the above and the time at my disposal does not permit of further observation.

The following are the results of injections made upon myself in studying its action. The preparation experimented with was in liquid form put up with a saturated solution of chloretone for purposes of preservation, which I believe is a mistake, as noted later. The solution was first boiled for ten minutes. Intradermal wheals were made in my skin at various points, using for each injection one c.c. of solution.

1. One per cent of apothesine, injection 9:55 p. m., slight negligible burning if injected too rapidly, which immediately subsided; no sensation if slowly injected. Immediate anesthesia. Within about ten minutes slightly pale area had developed around wheal and center became slightly pink. After fifteen to twenty minutes slight itching sensation. 10:30 p. m. pink center has become more marked. 11:10 anesthesia still complete. 11.25, returning sensation. 11:55, nearly normal sensation. 12:30, not yet

quite normal. Complete anesthesia for one hour and fifteen minutes. Pink center to wheal still persists, with a very slight suggestion of infiltration in surrounding tissues.

2. One per cent apothesine, five drops of adrenalin, 1 to 1000 to the ounce, injection 10:02, results similar to last injection, except that pale area surrounding wheal was slightly more marked, with pink center more pronounced. 12:15, anesthesia still complete. 12:30, returning sensation. Complete anesthesia one hour and fifteen minutes. Subsequent appearance of area same as with 1 per cent without the adrenalin.

3. One-half per cent apothesine, sodium chlorid 4 per cent; injection 10:07, no sensation during injection. Immediate anesthesia. Pink center and pale surrounding area as with other injections. 10:35, complete anesthesia. 10:40, returning sensation. 10:45, near normal. 11 o'clock, normal. Thirty minutes' complete anesthesia.

4. One-half per cent of apothesine, adrenalin solution 1 to 1000, five drops to the ounce. Injection 11 o'clock. Immediate anesthesia. Appearance same as above. Forty-five minutes' complete anesthesia.

5. One-half per cent apothesine, sodium chlorid 4 per cent, adrenalin solution 1 to 1000, five drops to the ounce. Injection 10:13. 11:30, complete anesthesia. 11:37, returning sensation. 11:50, nearly normal. Complete anesthesia one hour and fifteen minutes. Appearance of injected area same as above.

6. One-fourth per cent apothesine. Injection 10:33. No sensation. Immediate anesthesia. 10:55, complete anesthesia. 11:05, returning sensation. 11:15, nearly normal. 11:28, normal. Pink center and pale surrounding area less marked than with the stronger solutions.

7. One-fourth per cent apothesine, 4 per cent sodium chlorid. Injection 10:38. No sensation. 11:15, complete anesthesia. 11:19, returning sensation. 11:35, nearly normal. 11:50, normal. Thirty-seven minutes' complete anesthesia. After appearance same as above.

8. One-fourth per cent apothesine, adrenalin solution 1 to 1000, five drops to ounce. Injection 11 o'clock. 11:40, complete anesthesia. 11:45, returning sensation. Forty minutes' complete anesthesia. After appearance same as above.

9. One-fourth per cent apothesine, 4 per cent sodium chlorid, adrenalin solution 1 to 1000, five drops to ounce. Injection 11:13. 11:50, complete anesthesia. 12 o'clock, returning sensation. 12:35, nearly normal. Thirty-seven minutes' complete anesthesia.

The next day, a slightly reddish punctate spot marks the site of the wheals. This is more marked in those in which the stronger solutions have been used and slightly more so where adrenalin had been added. Slight soreness and itching in all spots when manipulated, but not noticeable without manipulation. In the two 1 per cent injections a very slight infiltration of the tissues noticeable. The frequent examination of the areas in which they were stuck by a needle every few minutes during the period of the examination should be considered in drawing conclusions from their appearance. The anesthesia in all cases was immediate and complete and disappeared very slowly. It was often longer than one-half hour from the time returning sensation was first noted until it appeared normal. The pink appearance in the center of the wheal in the case of the stronger solutions persisted for forty-eight hours, but no similar reaction had been noticed in the clinical use of the drug, although the wound had been closely watched. To determine the cause of this reaction two injections were made into my skin with solutions, prepared by tablets of the same drug which did not contain chloretone. In each case there was no sensation during the injection and the central pink area and surrounding pale areola were less marked and disappeared after a few hours. Otherwise, the resulting anesthesia and its duration were the same. The site of injection, if disturbed by manipulation, gave a slight itching sensation, otherwise it was not noticeable.

To test the effect of chloretone when injected alone, I injected my forearm with ten minims of a saturated solution of chloretone, 8 per cent, the same strength with which the apothesine is put up; slight burning occurred if injected too rapidly. When tested with a point of a needle for anesthesia, it was found to be completely anesthetic only in the center of the wheal and wherever the needle was entered, a red punctate spot appeared immediately and remained permanently. Otherwise, the wheal presented no change in appearance from the surrounding tissue. Anesthesia lasted about forty minutes' only in the center; the periphery quickly returning to normal.

I am consequently forced to the conclusion that much of the after appearance of the injected areas in these experiments must be due to the presence of chloretone in the solution and accordingly suggest that this method of preparing the solution be changed, as it probably will, and a drug marketed in powder form, as is the case with other local anesthetics.

In conclusion, I wish to state that I believe this preparation has a decidedly useful future and should be given a fair and impartial trial. In my own observation it compares, at least in its anesthetic producing properties and its low degree of toxicity, very favorably with novocain.

ANESTHESIA: SUGGESTION BEARING UPON ITS STANDARDIZATION FOR TEACHING PURPOSES.*

PALUEL J. FLAGG, M.D.

Any man who administers anesthetics is at some time or other called upon to impart his knowledge to others who are being initiated into this special branch of the practice of medicine. In order to get close to the student, we must explain the subject in simple words before we allow ourselves to become technical. It is perfectly easy to lose our audience by employing unfamiliar terms, or terms which mean little to the average man. For example, take the term, "vapor tension." What does that mean to the man whose last intimate acquaintance with physics was five or more years ago? The incidental employment of such a term may pass, but if we proceed to make use of it to illustrate or compare, our audience is left behind. According to the general meaning of the term, teaching is not an effort to ventilate our opinions, but to impart them to others, and this can be done only by being sure that the terms which we employ are perfectly familiar to all.

Men who are specially interested in a particular subject are prone to ignore or slur over the wearisome and simple fundamentals which brought them to their present point of view. As a consequence, the student who has missed the fundamentals cannot grasp or appreciate that which is being placed before him. In teaching the art of anesthesia, we are prone to depend upon the information which the student is supposed to have gained in his materia medica and therapeutics. In describing the signs of anesthesia, we speak of them as occurring during certain stages. We speak of the excitement of the first stage, of the dilated pupil of the third stage. The term, preanesthetic stage, is often heard. It is said that such and such an operation can be done in the preanesthetic stage, during which the patient *is* yet *is not* anesthetized. We have been brought up upon the term, surgical anesthesia. This is thought to be a very definite stage, in spite of the fact that anesthesia sufficient for the opening of a boil is a very different thing from that which is needed for a laparotomy. If we can establish a classification of the stages of anesthesia which can be used as a basis for all anesthetic agents administered by all methods, we may speak to the uninitiated and to one another in a manner to be understood.

The classification of the stages of anesthesia which follows might be called a clinical classification, or a classification combining the findings of the physiological laboratory and the operating room. This classification is not only easily grasped, but is equally easy to retain and demonstrate.

GENERAL, LOCAL, AND SPINAL OR MIXED ANESTHESIA.

These form the three primary divisions, and are based upon the extent to which the nervous system is anesthetized. In general anesthesia both the central and the peripheral nervous system is anesthetized; in local anesthesia only the peripheral nervous system is involved. In mixed or spinal anesthesia, part of the central nervous system (the spinal cord) and the peripheral nervous system are under the influence of the anesthetic.

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*Read before the New York Society of Anesthetists, May 26, 1916.

We recognize two degrees of general anesthesia, complete and incomplete. These degrees are characterized by the presence or the absence of complete muscular relaxation. In a complete general anesthesia, the relaxation is universal; in an incomplete general anesthesia, relaxation is partial or absent.

A complete general anesthesia consists of three stages: I. Induction; 2, maintenance; 3, recovery. These three stages may readily be represented by a curve (Fig. 1). They are present and demonstrable with all anesthetic agents and with all methods which yield complete muscular relaxation.

The stage of induction begins with a loss of consciousness and ends with the onset of complete relaxation.

The stage of maintenance begins with the completion of relaxation and continues until the administration of the anesthetic is permanently reduced with a view of bringing the patient back to consciousness.

This very simple classification of the stages of anesthesia may be used as a basis for the discussion of any anesthetic agent administered by any method.

Where a detailed study is desirable, we may attack the subject by considering the evidences, the causes, and the control of the periods of excitement, rigidity, and relaxation; for example, the causes of the period of excitement:

Physiological effects of ether.
Lack of preparation or faulty preparation.
Alcoholism.
Temperament.
Overconcentration of the anesthetic.
Excessive smoking.
Sexual.
Previous unsatisfactory anesthesia.
Nasal obstruction, almost the rule in children.
Failure to understand what anesthesia means.
Excessive fear.
Remarks which the patient hears before losing consciousness.

The curve which represents complete general anesthesia forms a basis upon which we may become familiar with the idea of vapor tension or anesthesia by the percentage method.

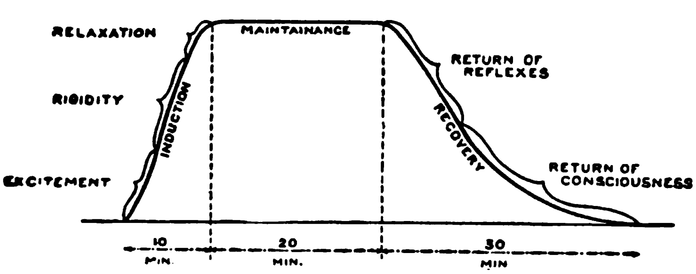

Fig. 1.—Curve of complete anesthesia; *a*, excitement; *b*, rigidity; *c*, relaxation; *d*, return of reflexes; *e*, return of consciousness; *f*, induction; *g*, recovery. (Courtesy J. B. Lippincott Co., *Art of Anesthesia*.)

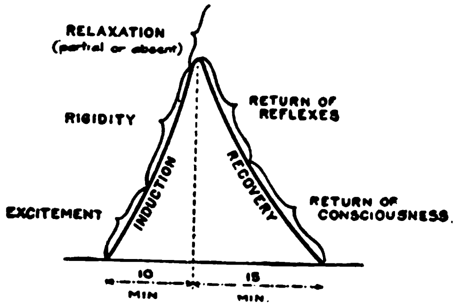

Fig. 2.—Curve of incomplete anesthesia; *a*, excitement; *b*, rigidity; *c*, relaxation; *d*, return of reflexes; *e*, return of consciousness; *f*, induction; *g*, recovery. (Courtesy of J. B. Lippincott Co., *Art of Anesthesia*.)

The stage of recovery begins when the administration of the anesthetic is permanently reduced with the view of bringing the patient back to consciousness, and ends with the return of consciousness. Induction anesthetizes the patient; maintenance keeps him anesthetized; recovery returns him to consciousness.

The stage of induction consists of three periods: 1. Excitement; 2, rigidity; 3, relaxation.

The stage of maintenance is not subdivided, but two varieties may be observed: *a*, Constant maintenance; *b*, variable maintenance.

Constant maintenance is obtainable only where a special device is employed which will deliver to the patient a large volume of ether vapor of a definite percentage under pressure; such an apparatus as the Connell anesthetometer, for example.

All other methods of anesthetization yield a *variable maintenance*.

The stage of recovery is naturally divided into two periods: 1. The return of the reflexes; 2, the return of consciousness.

The end of the first period comes about in the operating room, while the patient is under the immediate supervision of the anesthetist. The end of the second period usually takes place after the patient has reached his bed, and has passed into the nurse's care.

Two types of recovery are easily recognized: 1. Recovery by crisis; 2, recovery by lysis.

The first type is best characterized by the recovery which we see in a gas oxygen anesthesia; the second is the usual recovery seen in a prolonged ether anesthesia.

Where such a classification is employed, the signs of anesthesia may be definitely charted. We may speak of the behavior of the pupil under ether during the stage of induction, maintenance, and recovery with the assurance that the time specified will not be misunderstood. We may speak of the complicating effects of morphine upon the same basis. The detailed effects produced by rebreathing with various anesthetics are thus quite easily identified.

It will be seen from the foregoing that muscular relaxation is a test of the worth and efficiency of the general anesthetic. An anesthetic which will not bring about good relaxation, even though it is safe, can never be other than a method of choice in selected cases. We must not forget that the anesthetic is but a means to an end, not an end in itself; that the inexperienced surgeon, the man who does not object to rigidity, will not learn to do good work, that the experienced surgeon cannot do his best work in the face of muscular rigidity.

In upholding the cause of relaxation, we do not intend to overshadow *safety,* immediate or remote. We speak of this quality as *an* essential, not as *the* essential. We do not intend to discountenance gas oxygen or to exalt chloroform. What we wish to do is to emphasize the necessity of relaxation where indicated, and to point out the fact that the routine anesthetic must be capable of bringing about this effect.

In conclusion, then, we offer this clinical classification of the stages of anesthesia in the hope of simplifying the technical subjects which we present for the consideration of one another.

120 CENTRAL PARK SOUTH.

Quarterly Index
Of the Current Literature of Anesthesia and Analgesia.

Alcohol for Tic Doloreux, Technic of Injecting the Gasserian Ganglion with. G. M. Dorrance, Philadelphia. Dental Cosmos, January, 1917.

Alcohol Injections in Trifacial Neuralgia: Report of Case. S. R. Benedict, Birmingham, Ala. Southern Medical Journal, December, 1916.

Anesthesia, Remarks on and Presentation of a Record Chart. Emil Specht, New York City. Dental Items of Interest, January, 1917.

Anesthesia in Obstetrics. Walker B. Gossett, Louisville, Ky. Therapeutic Gazette, February, 1917.

Anesthesia and Acidosis. H. A. Sanders, New York City. New York Medical Record, January 27, 1917.

Anesthetic and Narcotic Drugs, Certain Tests for. E. H. Hankin. Indian Journal of Medical Research, October, 1916.

Apparatus—Improved Instrument for Maintaining Oral Air-way During General Anesthesia. Joseph E. Lumbard, New York City. Medical Record, November 25, 1916.

Blood Pressure During Operations. Charles W. Moots, Toledo, Ohio. American Journal of Obstetrics, December, 1916.

Blood Pressure and Graphic Vasomotor Changes in the Periphery During Ether Anesthesia. W. E. Muns, Columbia, Mo. Annals of Surgery, December, 1916.

Blood Pressure as a Guide During Major Operations. Harold G. Giddings, Boston, Mass. Interstate Medical Journal, January, 1917.

Chairman's Address—Interstate Association of Anesthetists. Hugh W. MacMillan, Cincinnati, O. Journal of the National Dental Association, January, 1917.

Chloroform for General Anesthesia, Its Dangers. O. Clark. Brazil Medico, September and November, 1916. Nos. 43-45.

Cocaine, Use of by Unregistered Persons. British Journal of Dental Science, November 1, 1916.

Conductive Anesthesia with Lantern Slide Demonstration. H. A. Potts, Chicago, Ills. Dental Review, December, 1916.

Conductive Anesthesia, Injecting for: a Valuable Hint. Prime. Pacific Dental Gazette, November, 1916.

Conductive Anesthesia, Extraoral Methods for Oral Surgery. Kurt H. Thoma, Boston, Mass. Journal of the National Dental Association, January, 1917.

Conductive Anesthesia of the Maxillary Nerve. Rattel. Deutsche Monatschrift f. Zahnheilkunde, July, 1916.

Deaths, Sudden, During Bronchoscopy: Physiologic Study. C. J. Imperatori, New York City. Laryngoscope, November, 1916.

Ether Anesthesia. H. H. Amsden, Concord, N. H. Boston Medical & Surgical Journal, November 30, 1916.

Ether or Nitrous Oxid-Oxygen, Which is Safer? J. W. Seybold; Denver, Col. Medical Record, January 13, 1917.

Ether Pneumonia, So-Called, Relation of to Pelvic and Abdominal Surgery. W. E. Darnell, Atlantic City, N. J. New York Medical Journal, February 3, 1917.

Infiltration and Conductive Anesthesia, Vibratory Massage as an Aid in. Faesh. Pacific Dental Gazette, October, 1916.

Infiltration Anesthesia for Tonsillectomy, Together with the Employment of Normal Saline Solution. M. S. Ersner, Philadelphia, Pa. New York Medical Journal, January 6, 1917.

Intratracheal Anesthesia. Editorial. Wm. H. Long, Louisville. Kentucky Medical Journal, March, 1917.

Local Anesthesia, a Study in the Disputed Points of. S. L. Silverman, Atlanta, Ga. Dental Summary, January, 1917.

Local Anesthesia for the General Practitioner. H. J. Merkeley, Winnipeg, Canada. Oral Health, October, 1916.

Local Anesthesia and General for the Elderly. P. Bazy. Bulletin de l'Academie de Medicine, October 24, 1916.

Local Anesthesia, Some Experiences with. B. P. Campbell. The Practitioner, January, 1917.

Local Anesthesia: Technic of Suparpubic Prostatectomy Under. B. S. Barringer, New York City. Surgery, Gynecology & Obstetrics, December, 1916.

Local Anesthesia—Prostatic Hypertrophy: With Report of 400 Prostatectomies. B. Sherwood-Dunn, Paris. American Medicine, January, 1917.

Local Anesthesia for Children. E. H. LaChapelle. Nederlandsch Tijdschrift voor Geneeskunde, December 9, 1916.

Narcoanesthesia. H. Beates, Jr., Philadelphia, Pa. New York Medical Journal, January 13, 1917.

Nitrous Oxid-Oxygen Anesthesia, Report of Long Cases. J. R. McCurdy, Pittsburgh, Pa. Journal of the American Medical Association, February 17, 1917.

Nitrous Oxid-Oxygen Anesthesia, Delivery Under of Two Patients with Lost Cardiac Decompensation. W. T. Getman, Buffalo, N. Y. Journal of the American Medical Association, February 17, 1917.

Nitrous Oxid-Oxygen Anesthesia for Conservative Operations. T. B. Hartzell, Minneapolis, Minn. Dental Cosmos, January, 1917.

Nitrous Oxid-Oxygen, Alone and in Mixture and in Sequence, for Dental Operations. W. Guy, Edinburgh. Dental Cosmos, December, 1916.

Nitrous Oxid-Oxygen Anesthesia, Nausea and Vomiting After. W. L. Soule. New York City. Medical Record, December 9, 1916.

Nitrous Oxid-Oxygen Anesthesia in Surgery and Obstetrics: Some Problems in the Use of. C. H. Davis, Chicago, Ills. Interstate Medical Journal, December, 1916.

Nitrous Oxid-Oxygen Anesthesia and Analgesia in Obstetrics. W. H. Long, Louisville, Ky. Therapeutic Gazette, February, 1917.

Nitrous Oxid-Oxygen Anesthesia, Exodontia Under. Bertram R. Perkins, New York City, N. Y. The Dental Digest, December, 1916.

Novocain, Pharmacology of. Egglestone. Pacific Dental Gazette, November, 1916.

Novocain, Tonsillectomy Under. P. M. Lewis. New York City. Medical Record, December 23, 1916.

Painless Childbirth. E. P. Davis, Philadelphia. Therapeutic Gazette, February, 1917.

Paraform as an Obtundant. Cowling. Pacific Dental Gazette, October, 1916.

Perineural Infiltration and Epidural Injections in the Treatment of Sciatica. Charles Rosenheck and Harry Finkelstein, New York City. Journal of the American Medical Association, December 30, 1916.

Perineural Blocking in the Field. H. H. Schmid. Muenchner med. Wochen. November 21, 1916, lxiii. No. 47.

Postoperative Acute Dilitation of the Stomach. G. V. Riestra. Cronica Medica, Lima, Peru. November, 1916, xxxiii, No. 641.

Sacral Anesthesia for Pruritus. W. Holland. Norsk Magazin for Laegevidenskaben, December, 1916. lxxvii, No. 12.

Shock, Nervous. Roger. Presse Medical, November 20, 1916, xxiv, No. 64.

Spinal Anesthesia: Report of 170 Cases Operated on Under. T. A. Weston. British Medical Journal, December 9, 1916.

Spinal Anesthesia, Routine, with Report of 6,229 Cases. Augusto S. Boyd and Carl C. Yount, Panama City, Panama. Journal of the American Medical Association, February 24, 1916.

Spinal Anesthesia with Special Reference to the Acute Abdomen. P. P. Cole. Lancet, October 7, 1916.

Stovain, Pharmacology of. M. I. Smith and R. A. Hatcher, New York City. Journal of Pharmacology & Experimental Therapeutics. January, 1917.

Twilight Sleep. H. Croom, H. Williamson and C. Berkeley. The Practitioner, January, 1917.

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THE BIOPSY: HOW THE SURGEON MAY CONTRIBUTE TO ITS DIAGNOSTIC VALUE.

B. G. R. WILLIAMS, M.D.,
PARIS, ILL.

Most surgeons are interested in tissue examinations. Many have recognized their value in controlling their work and in checking up their diagnoses, and have come to insist that they be done routinely. The instructions and advice which follow may be of some use to surgeons in large medical centers, but they are intended especially for the surgical specialist who desires or is forced to send the tissue by express to some distant pathologist. For it is certainly true that there are today comparatively few men who are expert in tissue work. A very large per cent. of our practical laboratory workers being recent graduates, they are not qualified nor are they usually willing to venture opinions until after they have had several years of experience.

And so the usual arrangement is as follows: The surgical specialist secures, preserves and sends the material to a pathological specialist, who examines it and returns an opinion usually in the form of a technical report which is filed away with the hospital records.

The smaller hospital is coming into its own. Practically any county can support a hospital and one or more men who give most of their time to surgery. Many of them can provide plenty of laboratory work and fair salary to a general laboratory man. But few communities can support an experienced tissue pathologist.

Inasmuch as surgeons continue to insist upon dependable work and demand opinions from experts (ofttimes the opinion of several men is asked), it is necessary that they understand in general the methods of securing, preparing and preserving tissues that they may be properly handled after reaching the laboratory.

Any tissue pathologist will concede that a certain number of specimens sent to him within a given time, are unfit for examination, and that an intelligent opinion is quite impossible. It happens, moreover, that the sectioning must be completed and staining methods applied, before this fact can be ascertained, and that it can be finally concluded that a diagnosis would be hopeless or unjustified.

The most frequent annoyances are specimens which prove to be sloughs, blood clots, mucus and other materials which contain no tissues. Failure to add preservatives results in desiccation or postmortem digestion or putrefaction, and renders examination well nigh impossible or reports misleading. The sending of large masses of tissue with small lesions which have not been marked, adds needless work and often confusion. Neglect upon the part of the surgeon to include instructions, frequently leads to misunderstandings.

SELECTION OF MATERIAL.

In general the following rule holds. Solid, living tissues should be secured whenever possible. A tissue, it must be understood, need not be normal to be living. Necrosis is a rather late event in all tumors, inflammations and other lesions. But disappointment is almost certain to follow when sloughs or obviously dead matter are sent. Friable, desiccated or pultaceous materials which have already separated from the living tissue, or may be loosed with ease, and represent the last stages of retrograde alterations, are usually "too far gone" for examination. There are a very few exceptions, very few. Now and then I have seen enough material picked by the finger from a cervical cancer, for a definite microscopic picture; but these instances are very, very rare. It is usually impossible to secure sections, the material may refuse to take the stain, or if it does take it, the picture is so blurred, misty, faint or confused that there is left a doubt in the mind of the examiner.

As a rule it is best to select the material from the periphery or base of the suspected neoplasm rather than from the center. We expect to find the retrograde processes further advanced in the center of the growth. Moreover, it is possible to demonstrate infiltration of normal tissues by morbid cells only by an examination of the periphery or base; and it must be remembered that the diagnosis of cancer is to be made not only upon the type of cells present, but also and mainly upon the relation of those cells to other tissues. Let it be repeated, *in suspected malignant growth, always secure material from the periphery or base of the suspected lesion* rather than from the center, although, if possible, submit specimen from both the living tissue and the possibly degenerate or necrotic center.

Breast Tissue.—Very often an entire breast is sent to the pathologist. It may or may not be evident just which portion should be examined, and which bits should be selected for sectioning. The surgeon should always remember that preservatives alter the appearance of tissues somewhat, and that which may be obvious to his naked eye, may be obscured by the time the specimen reaches the laboratory man.

It is a very simple matter to mark those portions which he regards as especially suspicious, and it certainly means much to the time and patience of the pathologist. The best method that has come to my attention is the passing of marking sutures. These may be passed through suspected nodules and tied, and when a description of them is included with the instructions, a more valuable report is made possible. A moment's reflection upon the part of any surgeon, would make clear the fact that were every portion of the female breast sectioned and examined, the laboratory man would have about a month's job upon his hands.

Many surgeons clip out the suspected nodules or areas, and this is perhaps the better method. The report applies to this lesion and to no other portion of the breast. If, however, the opinion of more than one pathologist is desired, this lesion or these areas should be divided among them. It is unfair to all parties concerned to send haphazard portions of the breast to several men: it must not be expected that their reports will agree, for normal portions will be received by some and cancerous portions by others. This applies to all tissue work and may be illustrated by a common example. A pie may be sliced into a number of equal parts, and yet some of these parts contain no plums. Remedy—slice the plums.

Cervix Uteri.—The above advice holds very well for the securing and apportionment of the uterus or of any other organ to pathologists, and the following pertains more strictly to diagnostic examination of cervical bits and curettings for evidence of malignant alterations.

In the first place it must always be remembered that because the pathologist finds no cancerous areas in the specimen submitted (test slice of cervix curettings), the organ as a whole cannot be confidently dismissed as normal. This is not the fault of the pathologist nor may it be the fault of the surgeon. For some reason the malignant portion may have been missed by the scalpel or curet. Fortunately this does not often happen: in fact I do not recall a single instance in which it has occurred where the test excision or curettings were properly taken. Of course this applies to the question of carcinomata, malignant adenomata, etc., which involve the inner portions of the organ, but not to fibroids, etc., of the wall. I know of at least one case of sarcoma which was so missed, but it was located in the muscular coat of the uterus and could not have been reached by curettage, and this fact was appreciated by all concerned.

The advice to avoid necrotic tissues, sloughs, clots and mucus holds here as elsewhere. A mass cast off from or easily separated from this organ is as a rule dead and examination of it is a waste of time. Now and then the pathologist may be able to identify islets of chorionic tissue or surmise from the general makeup that he is dealing with a sloughing fibroid, but as a rule cancerous bits must be scraped from the endometrium of the body or clipped from the cervix.

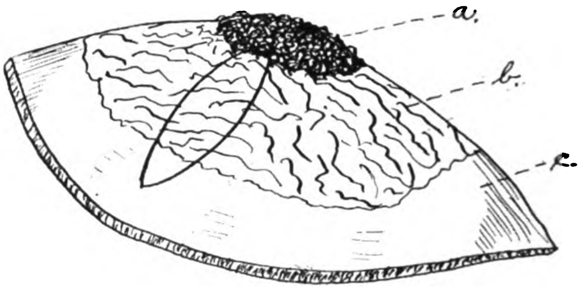

Fig. 1. Method of taking test specimen when the entire tumor cannot be submitted. a. Center of growth. b. Periphery of growth. c. Normal tissue.

My first intention in writing this article was to make it entirely original; and this has been an easy task, for I find but little in the literature upon my subject. These facts which I record have been suggested to me by years of experience and observation of many unfortunate misunderstandings and the reasons for such. However, I have come across one notable exception, and I wish to quote a couple of paragraphs from a book which really does give some usable advice in regard to test excision of the cervix. I quote from "Gynecological Pathology" of Abel-Bandler:

"No especial preparations are needed in making a test excision from the portio vaginalis. After introduction of the speculum, the vagina and external surface of the cervix should be thoroughly cleansed with a three per cent. solution of carbolic acid or with a 1 : 5000 bichloride solution. It is best first to irrigate the parts and then energetically wash them with cotton dipped in this solution.

"After fixing the anterior lip with the forceps, a wedge-shaped piece is cut from the desired area with Cooper's or any other angular scissors. Care should be taken to remove not only the affected portion, but if possible, *to select an area which shows the transition from healthy to diseased tissue* [Italics mine, Williams]. The resulting bleeding can usually be arrested by packing with cotton, yet at times one or more ligatures may be needed. At any rate, it should be a general rule that the patient lie quietly for some time after, to convince one's self that the bleeding has entirely ceased, for in some cases, even after such a slight procedure, severe bleedings may result unless sufficient precaution has been taken."

Anent curettings, it is scarcely worth while to advise surgeons concerning the method for securing these. In some cases, however, it may be impossible to secure enough material for study, and here it is well to dilate the cervix sufficiently to insert a finger. Thus the pathological region may be felt with greater accuracy and a portion of this removed with the spoon curet.

Skin, Mucous Membrane of Lip, Tongue, Etc.—The general advice given above holds here. Do not be content to remove a necrotic center, but submit a piece from the periphery of the lesion.

INSTRUCTIONS.

Sufficient instructions should accompany every specimen. It is not necessary to give details in regard to symptoms, family history, habits of patient, etc., but it is well to state in brief the origin of the material, what is suspected and just which parts of the specimen are regarded as suspicious. Just here I hasten to say that some surgeons hold to the idea that such information is likely to influence the opinion of the pathologist, but I do not believe that this is true. A competent examiner lays but little stress upon a clinical diagnosis: the modern tendency, it seems to me, is rather in the opposite direction, viz., to pick a flaw if possible, in the clinical diagnosis. We see this more and more every day, and it is emphasized especially in autopsy work. At any rate, such influence is overshadowed by the aid given to the pathologist, and this works also to the advantage of the surgeon and patient. Pathologists, as a rule themselves in their ability to identify organs and tissues even when diseased: but now and then this little "game" works out badly for all concerned. A growth which may be normal or only semi-malignant in one location, may elsewhere be very malignant in character. I can give many examples, and these are only a few:—Fibrous polyp of the external auditory canal, is very likely to recur after removal (Adami); speaking of thyroid cancer, Mallory emphasizes the fact that its metastases may correspond in every way to normal thyroid tissue, and yet if the examiner knew that the material came from the lung or liver, he would not term it normal; the same authority in speaking of differentiating between fibroma and fibrosarcoma, points out that the dividing line is not always easy to determine, and emphasizes the value of demonstrating mitoses, a consideration demanding that the pathologist know whether or not the material is a tumor or a fibrous tissue repair. And there are other instances.

The surgeon should always indicate which portion of a large tissue specimen appeared to be suspicious before the preservative was added, and the suture method recommended above may be used in connection with the instructions.

Where a tumor has a definite wall, this should be included at least in part. I have seen at least one epidermoid cyst, the contents of which consisted of masses of fairly well preserved flat epithelial cells, and an examination of these alone, would have led to a decision of epithelioma. However the wall of recticular tissue declared the diagnosis.

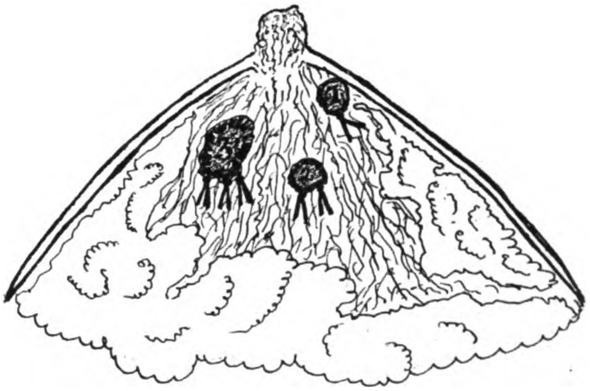

Fig. 2. Method of marking by knotted sutures, the portions of the unpreserved breast, regarded by the surgeon as suspicious. The organ has been bisected to show the inner portion. For example, a single suture may be used if there is a single suspicious area or nodule. In case there are more, two sutures may be used to designate No. 2 and so on.

PRESERVATIVES.

This has always been a pet subject with me, and other tissue men hold very definite ideas in regard to preservatives and fixing agents. I prefer formalin always, and this solution should not be too strong. Very large masses of material should be incised at points to permit the formalin to permeate all portions. A ten per cent. solution is best, although I sometimes change this percentage after receiving the material. Formalin, relatively speaking, is a newer preservative; but daily it is gaining a place in the medical laboratory. It is a powerful and beautiful fixing and hardening agent. For many years I have emphasized the advisability of its use, but strange to say, the use of alcohol as a preservative has gained such a hold upon the average man, that about sixty per cent. of all specimens I receive, continue to come in that liquid which prohibitionists and pathologists loathe. The chief objections to alcohol are:

1. It dissolves the contents of the erythrocytes.

2. It renders the membrana propria less distinct than does formalin.

3. Pathologists prefer constant pictures, and constant pictures depend upon constant fixation as well as constant staining. The picture after alcohol fixation is different from that given by formalin. I prefer the formalin picture.

4. Ten per cent. formalin means more than "any old per cent." of "any old kind" of alcohol: it means more constant staining. I have received tissues in wood alcohol, denatured alcohol and even in whisky.

5. Alcohol prevents freezing, and if a prompt opinion is desired, alcohol thwarts this. By washing out the alcohol (a procedure taking an hour or several hours) and substituting formalin (another two hours), the frozen sections may then be made and a semi-prompt report sent; but if the alcohol is left in the tissues, we must fall back upon the tedious celloidin methods and keep the surgeon waiting for two or three days. Since the freezing methods have become so perfected and refined, we are rarely justified in holding up a diagnosis in this fashion.

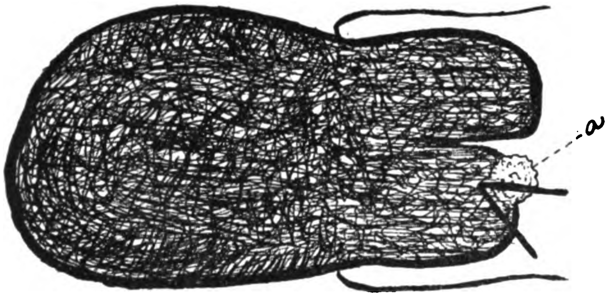

Fig. 3. Method of test excision of cervix. Shows how transition as well as diseased tissue should be secured. a. Suspicious nodule or erosion.

By all means, when sending a tissue to your pathologist, use ten per cent. formalin. His work will be more satisfactory. Very rarely should a tissue be presented and fixed otherwise, and then mainly for research work rather than diagnosis. I have made the statement that every tissue submitted in alcohol subtracts one year from the life of the pathologist, which of course is not true, for there would be no pathologists today.

CONTROLLING OPINIONS.

It is a general rule among tissue men that it is only the ignoramus who pleases to waste his time and money "trying out" the pathologist. Upon the other hand, the tissue man who professes to be supremely wise, deserves to be shown up now and then. Hippocrates, it is said, made few or no terse, dogmatic statements, but prefixed his opinions with the words, "It seems to me, etc." And after all, "tissue diagnoses" are but opinions, more valuable, it is true, than many other opinions, but opinions nevertheless. And in important cases, the surgeon may desire and is entitled to two or more opinions. The first pathologist may be chagrined that his opinion was not taken as final; but he must remember that we all make mistakes and that things are not always as they seem to be. Ofttimes I have witnessed surgeons persist until they found some pathologist who was willing to verify their clinical diagnosis, but patients can always find some doctor who will do as much for them; and the first man should not feel bad about it. There are very few "perfect days" for the student of tissue pathology. Moreover, contrary to common opinion, it has happened that the first diagnosis was after all, the correct one even though the second or last were ventured by some professor of pathology: I have seen it happen. Several years ago, a noted pathological clinic (this is not an experience meeting, but this instance is given to illustrate the above contention), showed me up to one of my clients, and I may or may not have deserved it. But my time came when a few months later they mistook a cancer for a benign growth. It was only human nature upon my part to feel a little relieved (not jubilant) about the matter, a feeling which most surgeons will appreciate, having experienced; although candidly, I am fair enough to concede that these pathologists were not given a square deal. They could not have reached such a conclusion had they been provided proper material, of that I will

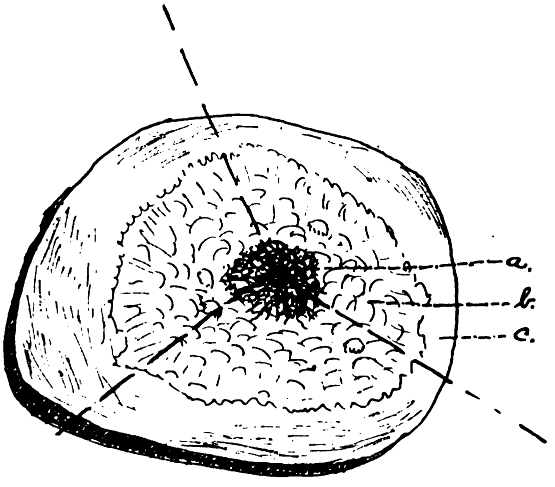

Fig. 4. Fair method for dividing suspicious skin lesion among three pathologists. a. Center in which retrograde alterations are likely to be advanced. b. Periphery, possibly infiltrated with living malignant cells. c. Surrounding zone of presumably normal tissue.

always be confident. But can the surgeon see it that way? I feel that the average surgeon is coming to view the situation in the proper light.

A word further in regard to trying out the pathologist. This is a disgusting business, and no surgeon of any standing would stoop to it. By some it has been regarded as a joke, although the joker usually attempts to injure the practice of the pathologist. I will repeat that it is the observation of tissue men that the perpetrator is almost invariably a man of mediocre training and ability. One of the best advertisements (and laboratory men, as well as surgeons, like good advertising), that was ever pulled off for me, was done by one of these fellows who "caught me up" on a diagnosis of "stratified squamous cell carcinoma." The second diagnosis (and of course this was the correct one), was epithelioma. There was a good amount of talking done, but eventually some one must have tipped him off to the fact that he was making an ass of himself. I confess, moreover, that I have upon at least one occasion been puzzled by a specimen which never came from the human, and several years ago failed to diagnosticate cancer of an organ because a nearby gland contained no cancer cells and so on, but I have always collected my fees and refused to do other work for these men. Other laboratory men have doubtless been victims.

At other times, innocent ignorance may be held accountable. In a certain instance, one laboratory man was given a cervix, and the body of the uterus was sent to another. Of course their opinions did not coincide, but this was satisfactorily explained to the physician by the surgeon.

When it is desired to send a tissue to two or several pathologists, by all means see that each gets an equal portion of the lesion and of all parts of the lesion. If the entire specimen has already been sent to one pathologist, and it is not wished to take his opinion as final, ask him to return the material or at least part of it, and send it to others. In this connection, it should be remembered that such a request should be made promptly, for while some pathologists do so, they cannot be expected to keep specimens indefinitely. I have always made this point clear to my clientele, and do not obligate myself to keep any tissue or mount after the first day of the following month. Pathologists who follow a similar custom should also make this point clear to the surgeons for whom they work.

Your country is at war! Are YOU going to help it?

THE SUCTION APPARATUS IN SURGICAL OPERATIONS.

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The employment of continuous aspiration or suction is fairly familiar in the drainage of the chest for empyema, of the bladder after prostatectomy,[1] etc. The usefulness of a suction device in the conduct of certain operations themselves is, however, not sufficiently appreciated. By its aid large collections of pus and other fluids can be speedily evacuated, and cavities can be irrigated, without soiling the patient, the operating field and the surgeons. It affords the best means of clearing the throat of mucus during any operation under general narcosis. *It is life-saving in surgery upon the mouth and pharynx, and in laparotomy for diffuse purulent peritonitis.*

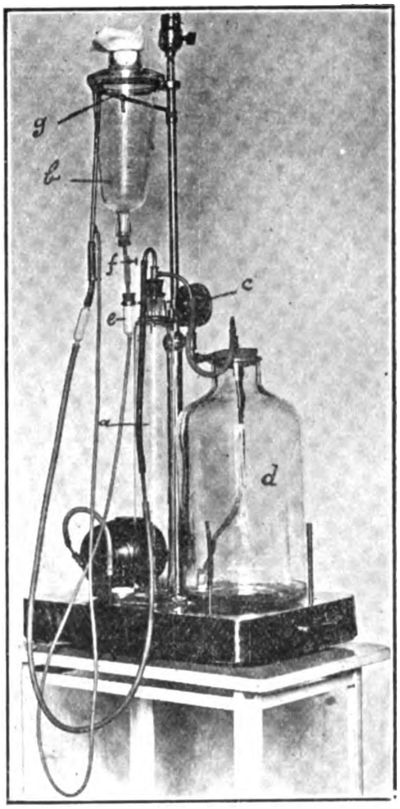


Figure 1. Kells suction machine, with attachment for irrigation, mounted on a metal base with handles for carrying.

In all operations upon the mouth and upper air passages conducted under general anesthesia (adenoidectomy, tonsillectomy, resection of either maxilla, glossectomy, etc.), where it is of great importance to prevent the inspiration of blood, and in such operations without narcosis as the evacuation of a retropharyngeal abscess, a suction apparatus should be regarded as an essential part of the surgical equipment. With a small aspirating tip blood and other fluids can be removed from the mouth and pharynx as fast as they appear. Mopping with sponges is awkward and unsatisfactory, it often interferes with the operator, and it occupies the whole attention of an assistant and a nurse. Last year Wessler[2], Manges[3] and Lilienthal[4] recorded their respective roentgenographic, medical and surgical studies of several cases of pulmonary abscess that developed after tonsillectomy. It is unnecessary to elaborate the argument for a suction device as a live-saving and therefore essential part of the armamentarium in operations upon the buccal and pharyngeal cavities.

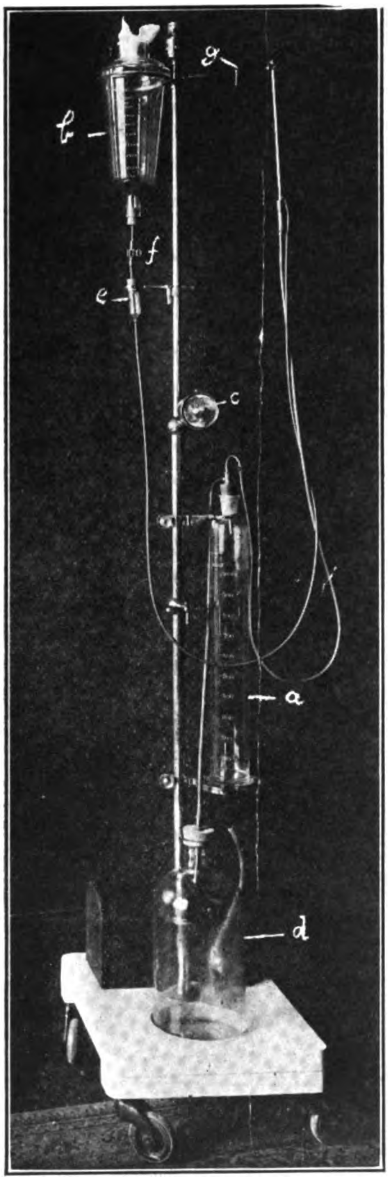


Figure 2. Kells suction machine, with attachment for irrigation, on a rolling base.

In bronchoscopic work a long, slender aspirating tip is necessary for clearing the field of fluid accumulations. Yankauer employs a small but sufficiently powerful electrically driven pump, and has developed to a nicety the technique of simultaneously irrigating and aspirating the bronchi in certain cases of pulmonary suppuration.

The prognosis in purulent peritonitis often depends largely, sometimes almost wholly, on the speed with which the operation is conducted. The indications are to deal with the source of the infection (ruptured appendix or pus tube, perforation of stomach or bowel) and to evacuate the accumulated pus. If the pus is removed by mopping and sponging the time thus consumed, which, in the nature of the procedure, must usually be added to that occupied in treating the primary lesion, may unduly prolong the operation and quite turn the tide against the patient. With a suction tip the pus can be removed rapidly and automatically, *while the perforation in the bowel or the gangrenous appendix is being attended to*—a saving of many precious minutes that may well mean the saving of a life!

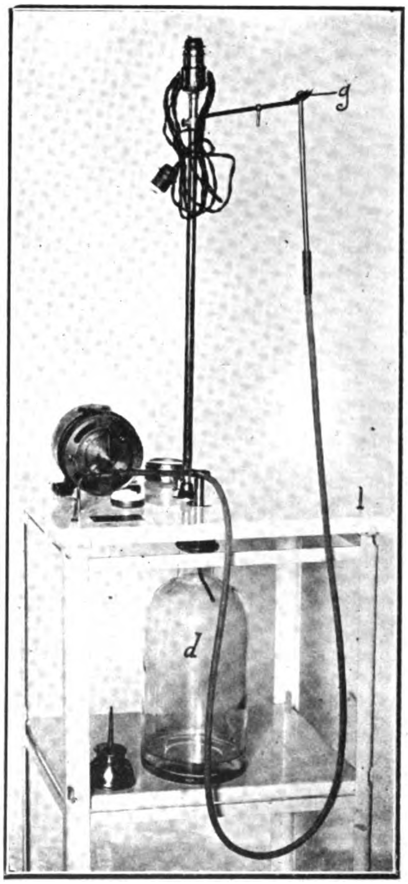


Figure 3. Kells suction machine permanently mounted on a table. Irrigating attachment omitted.

If the pus is not diffuse but is collected in the pelvis the aspirating method is not as important, but it is none the less superior to sponging, in that it is more thorough, more rapid, involves much less traumatism, and frees a nurse from the task of preparing the "wipes."

For the rapid evacuation of blood from the abdominal cavity, e. g., in ectopic pregnancy, the suction device is likewise of great usefulness.

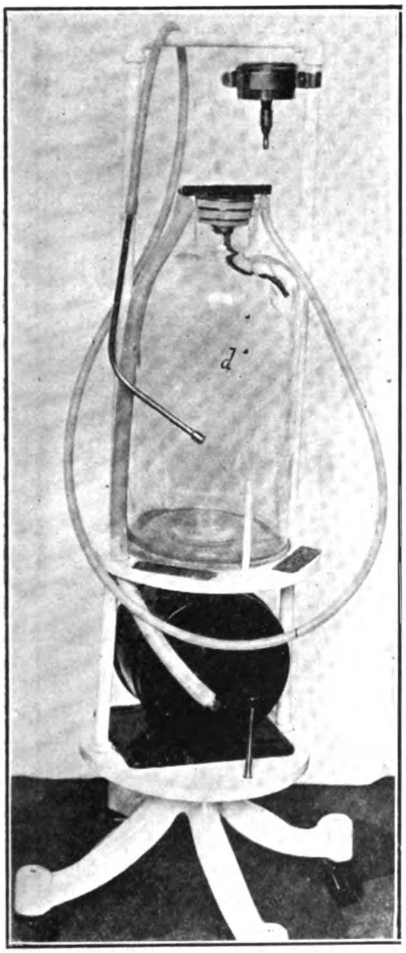


Figure 4. Special model of Kells suction machine on a rolling base.

Aspiration is performed through a suitable sterilizable metal tip (*vide infra*) leading the fluid through sterile stout rubber tubing to a vacuum bottle sufficiently large to contain all the evacuated liquid without overflowing into the pump. The latter may be a small "vacuum cleaner" apparatus, or an otherwise driven air pump of sufficient force and volume, or a Sprengel air pump attachment to a water or steampipe. Kenyon and Pool[5] described the employment of such a simple device on the Sprengel principle, using an "ejector" or a filter pump as an attachment to the water or steam-pipe or to the faucet, respectively. This device has several advantages: it is cheap; it is noiseless in operation; it is an inconspicuous, permanent attachment that can easily be installed in any operating room; it requires very little attention. In my own experience it has proven satisfactory. It is necessary only that the force and the volume of the flowing water or steam are sufficient. Kenyon and Pool state that the pressure must be twenty pounds.

Since September, 1915, we have used at Mount Sinai Hospital a movable electric suction machine kindly presented to me for trial by its designer, C. Edmund Kells, D.D.S., of New Orleans.

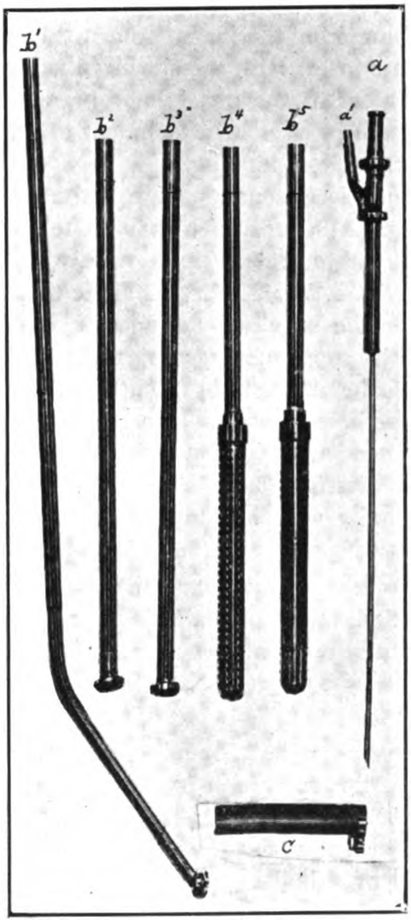


Figure 5. *a*, Universal stem for suction tips; the side arm, *a*¹, is for attachment of tubing from the irrigator. *b* ¹, ², ³, ⁴, ⁵, Suction tips (perforated shells fitting over suction stem). *c*, Coiled spring to prevent rubber tube kinking at *a*.

The apparatus consists of a 1-20 H.P. Emerson electric motor of 1800 r.p.m. and a vacuum pump built in a single unit, with but two bearings. The eccentric rotary pump, integral with the motor, bears two spring-governed vanes. It has no packings or valves and its power comes from the exactness with which it is machined. I have found that the apparatus needs no other attention than the precaution to put a little oil in the vents for the pump and the two motor bearings before using.

By means of a gauge (figs. 1 and 2, *c*) one can determine in advance that all connections are tight. By turning a serrated nut the vacuum can be regulated to any desired degree, up to about 20 inches, as indicated on the gauge. The gauge and regulator are mounted on the piping connecting the pump with the wide-mouthed two-gallon receiving jar (figs. 1 to 4, *d*). When it is desirable to measure the aspirated fluid a smaller, graduated container may be substituted for the large jar (figs. 1 and 2, *a*). Stout rubber tubing from the jar is connected by means of a short glass insert with the sterilized rubber tubing that terminates at the metal hand-piece. A coiled spring (fig. 5, *c*) over its attachment to the tip prevents the tube from kinking.

The hand-piece consists of a universal suction stem (fig. 5, *a*) over which may be telescoped the desired perforated metal tip, a variety of which is provided (fig. 5, $b^{1, 2, 3, 4, 5}$). These tips are fashioned after the excellent designs of Kenyon and Pool,[5] with supplementary openings to prevent injury to the tissues by "cupping." In addition to those here illustrated, Dr. Kells has made for me a very slender tip for aspirating blood from deep, narrow cavities in cranial operations, in which service it is quite superior to interminable mopping with strips of gauze.

To use with a suction machine he has also devised an admirable "non-leakable trocar" for emptying, without any spilling whatever, a distended gall-bladder or a cyst (fig. 6). It is thus described by its inventor:[6]

"This trocar carries a double-sliding and telescoping sheath, the outer end of which is bell-shaped, while the barrel of the trocar is perforated at stated places. The trocar blade is drilled and is carried at the end of a hollow tube, which in turn has an aperture.

"To use, connect rubber tubing from the aspirating machine to the outlet of the trocar and start the pump. Then, with the trocar withdrawn into the barrel, place the end of the barrel at the point to be punctured. Press the bell of the sheath firmly against the part, hold all firmly, and push the trocar blade down as far as it will go. By holding the sheath firmly, the barrel can be pushed in to any desired depth; then the trocar blade is rapidly withdrawn its full length, and the contents of the sac are quickly withdrawn by the aspirating device.

"Any fluid that may leak out around the barrel of the trocar is at once sucked into the bell-ended sheath and carried out with the rest of the fluid.

"Trocar blades of any desired shape or aspirating needles of any size or length may be used interchangeably in this device."

A unique feature of the Kells apparatus is the provision of a percolator (figs. 1 and 2, *b*), suspended at the top of a standard from which may be fed, drop by drop, normal saline, or any other solution to a point near the extremity of the operating tip where it is discharged *into* the suction tube. This solution mixing with thick pus or other fluid drawn into the head of the tip dilutes it and thus allows of the use of a low vacuum, a very desirable feature.

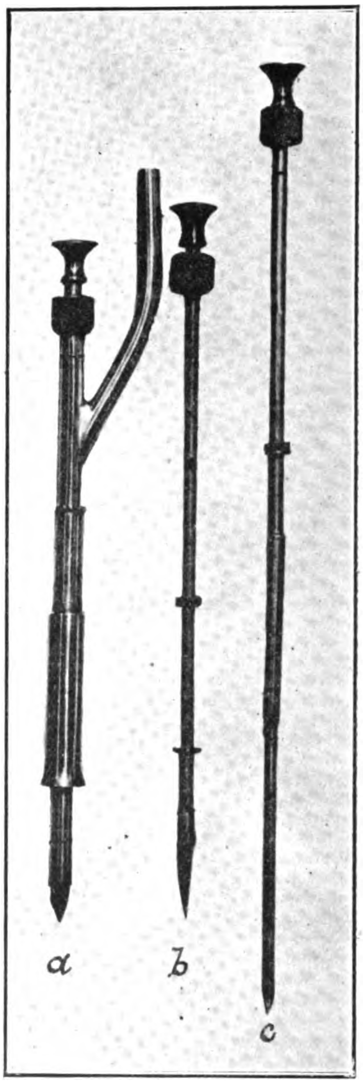


Figure 6. Kells non-leakable suction trocar for emptying the gall-bladder, etc. *a*, Instrument assembled, with trocar. *b*, *c*, Smaller trocars or needles, which may be used instead of the larger blade.

When the operator desires suction only, the solution from the percolator never flows out of the tip, but is carried into the receiving jar as fast as it is mixed with the fluid being aspirated. Upon the stem and the telescoping tips are two holes which can be made to register or not, at will. When plain suction is desired, the tip is slipped on to the stem in such manner that these holes do not register, and the suction at the end of the tip will then not be interfered with. When intermittent irrigation is desired, these parts are put together so that the holes do register. The hand-piece is now held so that this opening may be closed with the finger, whereupon suction is exerted at the end of the tip. Upon removing the finger, air rushes in this opening and interferes with the suction at the end of the tip and the fluid will run out. In this manner, a few drops of fluid can be alternately allowed to flow out from the end of the tip and then immediately picked up, thus cleansing a part expeditiously and perfectly without danger of spreading infection. A sight feed (figs. 1 and 2, *e*) is provided so that the flow of the solution to the hand-piece may be constantly gauged. This is controlled by a compressor (figs. 1 and 2, *f*).

Excellent as is this device for intermittent irrigation and for diluting viscid fluids, I have not found it necessary in my own work, and I usually employ the apparatus without it (fig. 3).

By means of a sterilizable bracket (figs. 1, 2, 3, *g*) and switch key handle, the surgeon himself may manipulate the machine without assistance, if necessary.

Dr. Kells has made some modifications of his instrument, and he assembles its parts in various ways, as indicated in the photographs, to meet individual preferences.

The chief purpose of this communication is to supplement the reports of others on the usefulness of an aspirating device in various surgical operations and, especially, to emphasize its life-saving importance in operating within the mouth or pharynx and for diffuse purulent peritonitis. Incidentally, I would record the entire satisfaction with which I have for a year and a half employed the apparatus here described.

References.

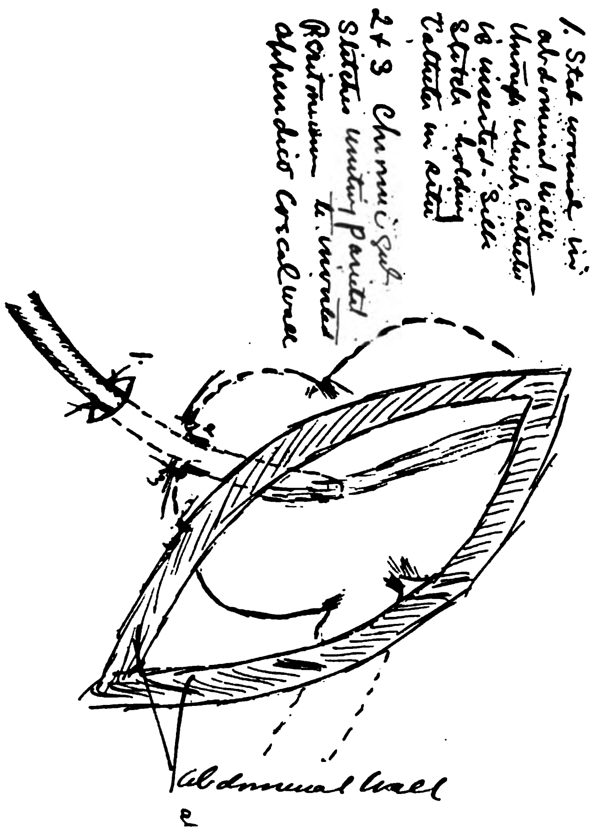
1. Hume, Logan and Kells: An improved automatic suction apparatus for suprapubic cystotomy operations. American Journal of Surgery, June, 1916.
2. Wessler: Lung suppuration after tonsillectomy. Interstate Medical Journal, January, 1916. (Supplement).
3. Manges: The occurrence of abscess of the lung after tonsillectomy; with a report of nine cases in adults. American Journal of Surgery, March, 1916.
4. Lilienthal: The therapeutics of chronic non-tuberculous suppurative bronchiectasis. Annals of Surgery, July, 1916.
5. Kenyon and Pool. An apparatus for aspiration. Surgery, Gynecology and Obstetrics, December, 1909.
6. Miller: A non-leakable trocar. Surgery, Gynecology and Obstetrics, July, 1915.

The Army and Navy need more doctors—lots of them! Have you offered your services?

APPENDICO-CECOSTOMY IN CASES OF FULMINATING APPENDICITIS WITH PERITONITIS.

R. H. Jackson, F.A.C.S.,
Madison, Wis.

There is a procedure which I have found of great value in cases of acute fulminating appendicitis with perforation and savage onset with progressive peritonitis, cases where it is evident at operation that at very best the convalescence will be a stormy one, accompanied by marked abdominal distension with consequent disturbed cardiac action, vomiting and usually with great difficulty in getting the bowels to move, an event which is heralded with great satisfaction if it occurs, and dubious forebodings if it does not. I refer to the procedure of inserting a rubber catheter into the cecum through the stump of the appendix to which it is fastened with a chromic gut stitch and then inverted into the cecal wall by a purse string of fine chromic gut, the needle of which is then made to take a bite or two through the parietal peritoneum at the edge of a small stab wound in abdominal wall through which the catheter has been passed before placing it in appendix stump. The catheter is also fastened to the skin by a linen suture and connected by a tube to an appropriate vessel at the


1. Stab wound in abdominal wall through which catheter is inserted. Silk stitch holding catheter in situ
2+3 Chromic gut stitches uniting Parietal Peritoneum to inverted appendico cecal union
1
Abdominal wall
e

side of the bed. This appendico-cecostomy permits:

1. The escape of large quantities of gas and lessens the abdominal distension and distress.
2. Permits the giving of normal saline directly into the head of the colon by the drop method.
3. The day after operation by giving a pint of hot saline rather quickly the presence of it in the cecum seems to relax the spasm of the ileo cecal valve and is frequently followed by a copious bowel movement. If necessary oxgall or other enema may be given with much more chance of success than by the rectal method.

I have used this procedure in eighteen cases and feel sure that it was of great benefit. While I have not seen any published account of this method I do not wish to claim any originality for it. My attention was directed to it several years ago by the late Dr. Arthur Wright, of Carroll, Iowa, who, having himself been afflicted with this type of appendicitis—the abdomen being greatly distended and the heart rapidly going to pieces under the embarrassment, related to me subsequently what a wonderful change took place in his condition within a few hours due to the sloughing or spontaneous opening of the appendix stump and establishment of a fecal fistula.

I have usually left the catheter in situ for a week or ten days. There is practically no drainage from its site after removal, the little wound being entirely healed in a few days.

The Autopsy.

The autopsy is not to be regarded merely as a perfunctory procedure for the purpose of clearing up doubtful diagnoses, or indeed for the satisfaction of the demands of insurance companies. There should be, in connection with every autopsy, a study of the clinical history, and a careful scrutiny of the objective phenomena which had been described by internes, attending physicians, and consultants ante mortem.

The ability to perform an autopsy should be within the technical equipment of every practitioner of medicine, particularly those who practice medicine in far distant places or isolated from the advantages of hospitals and laboratories.

The general public is still moved by sentimentality, and violation of the human form may be objected to on religious grounds. The attitude of the layman must be considered, but the progress of medicine must not be hindered by conservatism, ignorance, or sentimentality.—*American Medicine.*

THE TREATMENT OF COLLES' FRACTURE CONSIDERED FROM THE STANDPOINT OF MUSCLE PHYSIOLOGY.

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New York City,

Followning the work of Lane and Lambotte on the open or direct treatment of fractures, an enormous literature has appeared in recent years and has greatly stimulated interest in this much neglected but extremely important department of surgery. Naturally the treatment of fractures by the closed method has received a certain impetus secondarily, but the anatomic and physiologic factors operative in the production of deformity and the continuance of malposition, and the possibility of utilizing the traction of muscles inserting in the fragments as aids in maintaining a correct position after reduction have hardly received the attention they deserve.

It is the purpose of this paper to discuss rather broadly a few basic principles with regard to causation and retention of deformity on the one hand, and the mechanics of reduction and immobilization of fractures on the other, and subsequently to apply these principles to one of the commonest types of bone injury, namely, Colles' fracture.

In any fracture, aside from one which is impacted, the position of the fragments is determined (a) by the direction of the causative force, (b) by the direction of the planes of surfaces of the resulting fracture line and (c) by the action of overstimulated muscle upon the fragments themselves. In consequence, it is of the utmost importance to consider the various movements in all directions which the fragments may execute, the site of the fracture acting as a center around which the movement takes place. This immediately refers the problem incident to the reduction of the fracture to the realm of muscle physiology and necessitates a study of the action of the muscles upon the fragments, not as the muscles would act normally but as they determine position with reference to the newly formed point of motion. The problem of treatment therefore resolves itself into restoring bony continuity by bringing the fractured ends into apposition and placing the limb in such a position that equilibrium will be restored, if possible, between opposing groups of muscles to the end that the fragments be more readily restored to the anatomical and physiological norm; and in such a position immobilization apparatus should be applied. At all times the action of muscles upon the fragments must be studied carefully in the light of the abnormal center around which motion takes place and the final position in which the part is immobilized must be governed in great measure by these considerations.

It may be well to cite three examples, two of which are matters of common knowledge, in order more definitely to explain the points above mentioned.

First, fracture of the greater tuberosity of the humerus. In this fracture, in which the greater tuberosity is torn from the bone, there is present an uncontrollable fragment, that is a fragment acted upon by a synergistic muscle or group of muscles with no antagonist attached to the displaced fragment. Thus the tuberosity is drawn upward and its lower extremity is abducted by the supraspinatus muscle and at the same time drawn backward and slightly rotated outward by the infraspinatus and teres minor muscles. Consequently it lies in a horizontal plane beneath the deltoid muscle instead of in its normal vertical plane. The lower fragment thus having lost its power of initiating abduction of the arm through loss of the action of the supraspinatus is, upon action of the deltoid, drawn directly upward in a vertical plane and further movement is hindered by the contact of the fragments against the under surface of the acromion process. Inasmuch as there is no possibility of reducing the upper fragment, the obvious thing to do is through manipulation of the lower fragment to bring the fractured surfaces into apposition and this is done by immobilizing the extremity in a position of abduction and slight external rotation.

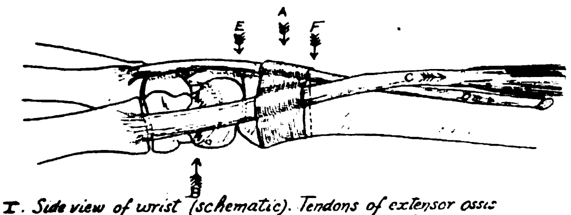

Fig I. Side view of wrist (schematic). Tendons of extensor ossis metacarpi pollicis and extensor carpi radialis longior are shown passing beneath the posterior annular ligament.

A. Posterior annular ligament
B. Level of anterior annular ligament.
C Tendon of extensor ossis metacarpi pollicis. arrow indicates direction of pull of muscle.
D Tendon of extensor carpi radialis longior. arrow indicates direction of pull of muscle.
E. Radio carpal joint (site of normal motion)
F. Usual site of fracture (site of abnormal motion).

A second type of fracture illustrating the point is that of the radius at the junction of the upper and middle thirds. Here the line of fracture is transverse and passes between the lower limit of insertion of the supinator brevis above and the upper limit of insertion of the pronator teres below. Stimulation of these muscles by the fracture gives rise to spasmodic contraction of each, and as a net result the upper fragment is drawn into a position of hypersupination, that motion being no longer limited by the pronators and lower portion of the interosseous membrane, while the lower is pronated by the action of these muscles. Furthermore, there is no pronator attached to the upper fragment, so the action of the supinator brevis is unopposed and the fragment is held in uncontrolled hypersupination. If, in addition, there has been lateral displacement due to trauma at the time of the injury, and this is usually the case, there is overriding of the ends of the bones due to contraction of the long muscles on the radial side of the forearm, namely, the brachio-radialis and the extensors of the radial side of the carpus. In reducing the fracture, the overriding of the fragments must be overcome by traction and because of the unopposed hypersupination of the upper fragment, the forearm must be held in hypersupination while the traction is being applied. If this is not done, the pressure exerted by the muscles of the forearm as soon as traction is stopped will lock the ends of the fragments and these will act as one bone during pronation and supination. Consequently if the lower fragment is in mid-pronation when reduced under traction, the ultimate result will be that mid-pronation will be the limit of the motion of supination after union has taken place for the supinator brevis will have to exert its maximum of contraction to obtain it, in view of the fact that it was contracted to its utmost when the fragments were reduced.

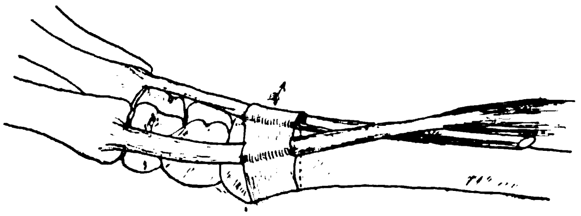

Fig II Side view of wrist (schematic). during slight contraction of muscles. Hand is being dorsiflexed. Arrow indicates direction of pull on posterior annular ligament.

The third example, the displacement of the shaft of a bone upon the head and neck, namely, fracture of the neck of the femur, seems especially well adapted to illustrate the importance of the physiological factors alluded to above. In this injury, the line of fracture runs as a rule from above and externally downward and inward and is for the greater part at least intracapsular. The head and portion of the neck attached to it is held approximately in the anatomical position—usually slightly tilted forwards, and is but very slightly mobile because (a) of the shortness of the lever by which it can be moved and (b) of the negative pressure within the articulation. The relative position of the great trochanter and shaft of the bone to the pelvis is markedly altered by the muscles attached to them. The muscles passing from the pelvis to the femur are all stimulated and in the normal condition this would result in muscle equilibrium, thus placing the thigh in the normal anatomical position. Acting through the false point of motion, however, the result is far different and may best be considered by taking up the action of the antagonistic groups of muscles: first, flexors vs. extensors; second, abductors vs. abductors: and, third, external rotators vs. internal rotators.

The flexors and extensors tend to draw the shaft of the bone directly upward, thus causing shortening of the extremity between pelvis and knee. The reason for this is that because of the solution of continuity of the neck there is now no connection between the shaft of the bone and the head, consequently the lever formed by the neck is of no value and the force exerted by the muscles is in a direction directly upward. The two groups of muscles being of approximately equal strength counteract each another and the position is not determined by the overaction of either group, i. e., neither flexion nor extension occurs as a characteristic deformity, the position in this regard being determined largely by gravity. The abductors and adductors exert a very abnormal action upon the thigh. The gluteus medius and minimus can no longer exert the power of abduction because of the solution in continuity of the lever which makes the action possible. In the normal condition, the neck of the bone acts as a lever of the second order and the contact of the head of the bone with the acetabulum the fulcrum—consequently a direct pull upward upon the great trochanter will cause it to move through the arc of a circle, the radius of which is equal to the distance between the center of the acetabulum and the point of attachment of the muscle. The shaft of the bone will thus be carried outward inasmuch as it is placed at an angle of 160° to the lever. In fracture, the normal lever being destroyed, the pull being exerted in an upward direction tends to carry the great trochanter, and with it the shaft of the bone, directly upward and draw the fractured surfaces past each another and thus there supervenes a second force tending to shorten the limb between pelvis and knee. The adductor group, which are not dependent entirely upon the neck of the bone for their action still exert a slight power of adduction, especially as they are no longer opposed by the abductors, at the same time the longer abductor muscles tend to shorten the thigh by the pull which they exert from above downward.

The action of the external and internal rotators offers a very interesting mechanical problem. Normally the external rotators are much stronger than the internal which latter comprise only the tensor fasciae femoris and the anterior thirds of the gluteus medius and minimus. In fracture, because of the loss of the action of the neck of the bone, the tensor fasciae femoris loses its power of internal rotation and aids the muscles mentioned above in shortening the thigh. In the normal condition, as Duchenne [1] has shown, the anterior thirds of the gluteus medius and minimus are abductors and internal rotators of the thigh, the middle thirds direct abductors and the posterior thirds abductors and external rotators. When the entire muscle mass acts, the anterior and posterior thirds neutralize each other and the resultant is direct abduction. In fracture, the entire muscle mass is stimulated and the resultant action is that brought about by the abductors as shown above. The internal rotators thus being disposed of, it remains to consider the true external rotator group. These being unable to act as true external rotators because of the loss of the leverage of the neck of the bone draw the great trochanter backward and inward, thus causing some external rotation as the fractured surface of the shaft rotates over the outer and posterior part of the upper fragment. This movement of external rotation of the shaft on its long axis is augmented by gravity acting with the weight of the foot. The resultant of all of the above forces is that the thigh is shortened and in a position of external rotation and slight abduction, while the upper fragment is pushed slightly forward by the lower fragment impinging on its posterior margin. The procedure advocated by Whitman of placing the thigh in a position of abduction and internal rotation overcomes the malposition, and immobilization in this position affords an antagonistic force to the muscles which are uncontrolled in their action, thus fulfilling the con-

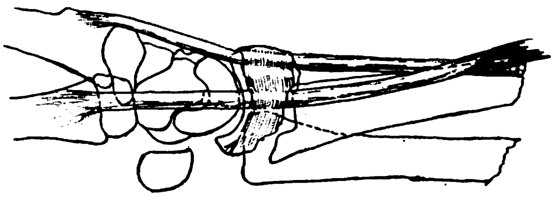

Fig III Tracing of radiograph of Colles' fracture. Forearm in position of pronation The tendons have been inserted schematically to illustrate the action of the extensors of the carpus upon the lower fragment.

ditions requisite for proper treatment of the condition.

The above examples illustrate the necessity for the study of muscle action upon the fragments in the light of the adventitious fulcrum present. It is purposed here to study rather fully the fracture of the radius known as Colles' fracture, which offers a problem similar to those quoted above, and particularly the example first cited, inasmuch as when studied with reference to the muscle physiology it falls into the class in which the smaller fragment is separated from the shaft and is acted upon for all practical purposes by one set of muscles only.

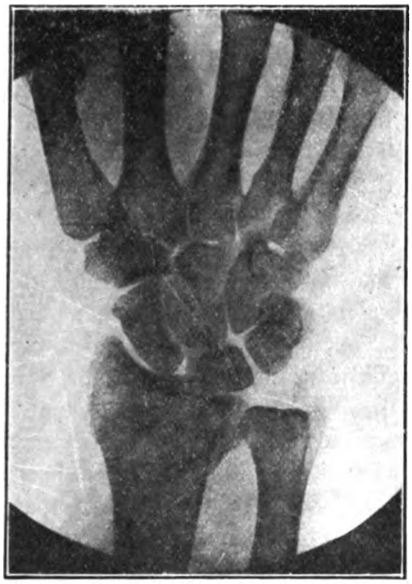

Fig. 4. Colles' fracture before reduction. Antero-posterior view.

By Colles' fracture is meant a fracture of the radius occurring from one-half to one and one-half inches above the articular surface of the inferior extremity of the bone. The theories as to the etiology of the fracture are two: 1st. Tearing off of the lower extremity of the bone by a pull exerted through the anterior ligament of the wrist joint. This alone probably rarely causes the injury. 2nd. The dissociation of the causative force into two, i. e., in a fall on the palm of the outstretched hand the force exerted from below in a direction upward and backward upon contact with the ground, is divisible into two distinct forces,—first a cross strain and second vertical compression. The cross strain directed backward against the lower end of the bone tears it free from the shaft at its weakest point, namely, through the cancellous tissue at the junction of the shaft with the lower extremity, and moves the lower fragment bodily backward. The compression force acting vertically in the long axis of the bone drives the lower fragment upward and tends to impact and comminute the fragments. It is very probable that both the "arrachement" or tearing through hyperextension and the force directed obliquely upward and backward are, in many cases at least, instrumental in the production of the fracture. In the majority of cases in which displacement is present, the line of fracture runs from below and anteriorly upward and backward and from within, that is from the ulnar side of the bone, outward and slightly upward. In addition, the continuation of the vertical force impacts the posterior portion of the upper fragment and results in a tilting upward and backward of the lower fragment around a transverse axis. The vertical diameter of the anterior portion of the lower fragment is slightly shortened therefore because of the compression of tissue due to the impaction, and the same is true of the posterior diameter of the upper fragment, usually to a somewhat greater extent. Upon reduction of the fracture, there exists in consequence a gap between the anterior and posterior margins of the bones and the two fractured surfaces are convex and in contact closely only at their points of greatest curvature. This predisposes the fragments to tilt one upon the other, the direction of this tilting being governed by the direction of the pull of the stronger set of muscles governing the fragments.

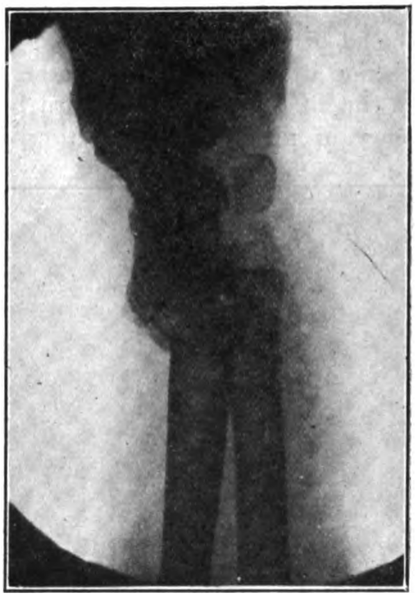

Fig. 5. Colles' fracture before reduction. Lateral view.

Before proceeding to the consideration of the action of muscles upon the fragments, it is necessary to review in some detail the normal relation of the muscles around the wrist joint and their action upon the lower end of the radius.

The mechanical arrangement of the muscles on the anterior and posterior aspects of the wrist joint differs very markedly when considered from the standpoint of their functional relationship to that joint. On the anterior aspect the muscles passing across the joint play through a pulley formed by the anterior annular ligament in front and the anterior surface of the carpus behind. The ligament is attached to the carpus, the outer extremity to the ridge of the trapezium and the inner to the hook of the unciform bone. Consequently the diversion of force when the muscles act occurs at a point distal to the radio-carpal joint and the tendency to pull the lower end of the radius forward is negligible. In fact flexion of the wrist tends rather to force the lower end of the radius backward because of the tendency of the long muscles to shorten the distance between carpus and humerus. On the posterior and outer aspect of the writ joint the arrangement of the muscles must be considered more in detail. Here the posterior annular ligament is attached directly to the lower end of the radius and forms compartments through which the various muscles attached to the bones of the hand pass. The radio-carpal joint is thus situated just distal to the pulley through which the muscles act and the force of the muscle action is exerted upon the deep surface of the annular ligament. Inasmuch as during extension of the wrist the tendons become angulated at the posterior annular ligament and contracted muscle endeavors to assume a straight line from point of origin to that of insertion, there must be a constant strain exerted upon the lower extremity of the radius in a direction from before backward and toward the radial side of the forearm. The muscles causing this strain are arranged as follows: On the outer surface of the lower extremity of the radius are the extensor ossis meta-carpi pollicis and the extensor brevis pollicis, the first of these arising in part from the posterior surface of the ulna and inserted into the base of the meta-carpal bone of the thumb. The extensor brevis pollicis arising from the radius and adjacent portion of the interosseus membrane may be left out of consideration here as it exerts but little effect upon the bone so far as the present problem is concerned. The next pair of muscles met with are the extensores carpi radialis longior and brevior which arise from the humerus, pass through a special compartment in the posterior annular ligament and are inserted into the second and third metacarpal bones, respectively. The action of the first of these is to extend the hand on the forearm and draw it toward the radial side, that of the second is direct extension of the hand. The extensor longus pollicis arises from the ulna and passes obliquely across the posterior aspect of the forearm, then through a special groove on the posterior surface of the lower end of the radius which is converted into a canal by the posterior annular ligament and finally is inserted into the base of the terminal phalanx of the thumb. This muscle extends the terminal phalanx of the thumb and the continuance of its action extends the hand on the forearm through the radio-carpal point. The extensor communis digitorum and extensor indicis arising from the common tendon of origin from the external condyle of the humerus pass through a separate compartment of the annular ligament and are inserted into the phalanges of the fingers. In addition to the above, the brachio-radialis arising from the external supra-condylar ridge of the humerus is inserted directly into the outer surface of the base of the styloid process of the radius. This muscle has a threefold action depending upon the position in which the forearm is placed when the muscle begins to act. When the forearm is pronated the muscle supinates to a position of mid-pronation, then becomes a flexor of the forearm and in consequence exerts a lateral strain on the lower extremity of the radius. When the forearm is supinated it becomes a pronator to the position of mid-pronation when it again assumes its action as a flexor of the forearm on the arm.

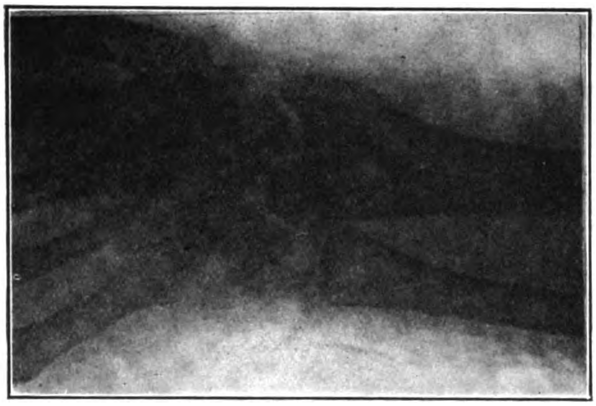

Fig. 6. Colles' fracture after reduction in supination. Antero-posterior view.

From the above it may be seen that the tendency of all the muscles passing over the lateral and posterior aspects of the wrist joint is to exert a strain on the lower extremity of the radius which tends to force this portion of the bone backward and toward the radial side of the forearm. (See figs. I and II.) The brachio-radialis, however, partially counteracts this tendency when the forearm is in complete supination, for it then draws the lower end of the bone forward into the position of mid-pronation, though tending at the same time to carry it outward toward the radial side through its attempt to shorten the distance between the humerus and the styloid process of the radius.

When a fracture separating the lower extremity of the bone from the shaft is present it can be seen that the tendency of the muscles, because ot the induced spasm, is to increase the deformity and, after reduction of the fragments, to predispose to recurrence. This recurrence is aided by two factors: (a) the sloping direction of the fracture line which allows the lower fragment to slide upward and backward upon the upper and (b) the convexity of the fractured surfaces which allows of only a relatively small area of contact between them.

Fig. III is a tracing of the fracture shown in figs. IV, V, VI, and VII to be compared with fig. II as it illustrates particularly well the above points. The patient, a male, aged 48 years, slipped and fell on an icy sidewalk striking on his outstretched left hand. He was admitted to the hospital one hour later. Figs. IV and V show the condition before reduction and figs VI and VII after reduction and retention according to the method to be described. It is interesting to note that in the antero-posterior view, fig. IV, before reduction, little or no deformity can be seen, and this is a very good illustration of the absolute necessity of taking roentgenograms in two planes or, better still, making stereoscopic roentgenograms.

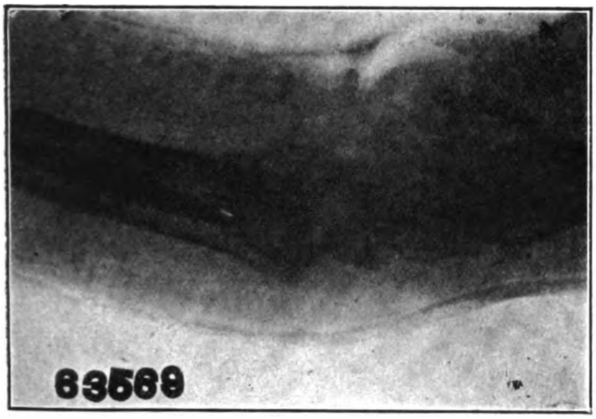

Fig. 7. Colles' fracture after reduction in supination. Lateral view.

The above facts being the case, the problem of treatment presents itself. Although the statement is frequently made that Colles' fracture properly reduced does not tend to recur and the result will be excellent irrespective of the form of retention apparatus used, the fact remains that on the average the result after a Colles' fracture with marked displacement is unsatisfactory from both functional and cosmetic standpoints. The period of convalescence is protracted and movements of the wrist, especially supination, are restricted permanently, though the function within the limits of motion may be good and the wrist fairly serviceable. The proof of the above lies in the records of the law courts—for with the exception of Pott's fracture, Colles' fracture is more commonly the cause of a lawsuit than any other.[2]

Inasmuch as the muscles acting most forcibly on the lower fragment, drawing it backward and rotating it outward on its long axis are situated upon the dorsal and radial side of the extremity, it seems that the indication is to shorten these muscles to their physiological limit and thus minimize the upward and backward pull on the fragment and at the same time offer an antagonistic muscle pull through the brachio-radialis, which, in the position of supination of the forearm becomes a pronator and thus tends to pull the lower fragment forward rotating it from behind forward around a vertical axis.

To ascertain the amount of shortening obtainable by this posture of the forearm measurements were made of the forearms of adults who had never had a fracture. The points selected for measurement were the external condyle of the humerus and tip of the styloid process of the radius. To obviate a change in the position of the tape measure, the points were marked on the skin in each case, and measurements were made in complete pronation and complete supination. It was found that in complete supination of the forearm the measurement was from 1.75 to 2 cm. shorter than in complete pronation and further that the shortening was a gradually increasing one during the act of supination. The explanation of this shortening is that in rotation of the head of the radius there is a lateral shift of the outer surface of the bone carrying it ulnarward away from the condyle of the humerus and as a consequence the measurement in supination represents the perpendicular leg of a right-angled triangle, while that in pronation represents its hypothenuse and is consequently longer. In addition to this the deviation of the long axis of the bone from the level of the bicipital tuberosity to the styloid process and the bowing outward of the shaft must be considered as adding to the lengthening upon pronation. This establishes the fact that in complete supination of the forearm, the muscles acting upon the lower fragment of the fracture have a shortened distance over which to work and are consequently relaxed to the greatest degree possible and being so shortened their power of producing deformity is much lessened.

In order to establish the correctness of the above in the actual condition, a patient with a typical Colles' fracture with the line of fracture as above described was placed under general anesthesia and the fracture was reduced. The forearm was then laid upon the arm rest of the operating table in the position of pronation and the muscles lying on the radial and posterior aspects of the forearm stimulated to a mild degree with the faradic current. The result was the immediate recurrence of the marked deformity. The fracture was again reduced and the forearm placed in complete supination and the same muscles stimulated as before, using the same amount of current. The tendency toward recurrence of the deformity was markedly less than before and in fact was hardly appreciable. Stimulation of the brachio-radialis in this position exerted a distinct pull on the lower fragment in a direction forward with a concomitant rotation of the fragment on its vertical axis to the position of pronation.

The conclusions drawn from the above observations are that when the forearm is in supination the fragments are retained in position by two elements. First, the muscles which draw the lower fragment backward and upward and rotate it toward the position of supination are shortened to their physiological limit and can no longer exert a pull upon the bone sufficiently powerful to dislodge it after reduction, and second, the brachioradialis being on the stretch because of its origin from the upper portion of the external supracondylar ridge and its direct insertion into the lower fragment on a plane lateral to that of its origin acts as an antagonist to the group just mentioned. Thus muscle equilibrium has been restored and the fragments tend to remain in place.

The methods recommended for the treatment of Colles' fracture, assuming complete reduction has been accomplished are many and vary from the simple adhesive plaster band about the wrist (Moore, Roberts) to the complicated traction and countertraction of Jackson. It is interesting to note that nothing is stated with regard to the position of the forearm with respect to pronation and supination. The majority of illustrations, however, figure the forearm in pronation with splints applied. Several years ago in the Roosevelt Hospital Out-Patient Department, New York City, it was the custom to put Colles' fracture up with the forearm in mid-pronation,[8] but the splints were not continued above the elbow and consequently the amount of hindrance they offered to pronation was slight.

During the past two and one-half years the following has been the procedure followed by me. The greater part of the work has been done in the Out-Patient Department and wards of the First Surgical Division of Bellevue Hospital, New York City. The opportunity to carry out the investigation was afforded by Drs. John B. Walker and Lucius W. Hotchkiss, who very kindly allowed me the privilege of caring for the cases of Colles' fracture admitted to their wards.

The technique of reduction and immobilization is as follows: The patient is anesthetized to the primary stage, nitrous oxide gas being used in the majority of cases and the impaction, if present, is completely broken up. This is accomplished in the following manner. The hand of the operator which corresponds to that of the injured wrist, grasps the hand as in shaking hands. The hand and wrist are then hyper-extended as far as possible, thus loosening the anterior portion of the fragments and increasing the deformity. The other hand of the operator then grasps the forearm at its lower portion just above the line of fracture. Traction and counter-traction are then applied, the hand of the patient being drawn into a position of marked ulnar abduction and at the same time the upper hand of the operator supinates the upper portion of the forearm while the lower hand slightly pronates the lower fragment, thus bringing them into as perfect alignment as possible. It may be necessary

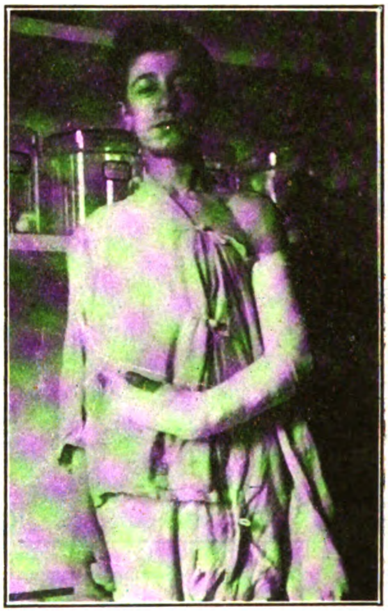

Fig. 8. Method of dressing in supination, with anterior and posterior molded splints.

at times to assist the pronation of the lower fragment by pressure with the tnumb upon the lower extremity of the radius. The above manipulation is carried out two or three times in order completely to break up impaction and secure complete reduction. It has rarely been necessary to resort to more forcible methods, but if such occasion should arise, any of the grips referred to by Cotton[4] may be employed.

At the end of the manipulation the forearm is placed in complete supination and flexed on the arm at an angle of 90 degrees. The brachio-radialis exerts a slight action of pronation upon the lower fragment, and it is well to assist this action by slight pronation of the lower fragment on the upper, but it is essential that the upper forearm should remain in complete supination. In this position antero-posterior molded plaster splints are applied, extending from the metacarpo-phalangeal articulations to a point half way between the elbow and shoulder. (See figure VIII). In the early cases the first immobilization extended from midarm to the tips of the fingers as shown in the illustration, the terminal portions of the splints being loose to allow movement of the fingers, which is encouraged from the very first. Very shortly, however, this was given up, and the splints extended only to the metacarpo-phalangeal joints. It is essential that the splints include and extend above the elbow, for in this way only can the movements of pronation and supination be interdicted. At the end of one week the splints are removed and the site of fracture examined, and at this time the splints are shortened to the middle portion of the hand. At the end of the second week the proximal portions of the splints are removed to a point just distal to the elbow, and at the end of the third week the splints are removed entirely and the forearm carried in a sling for the fourth week, at the end of which time in many cases fair function has been reestablished, and at the end of the fifth week many of the patients have been able to do light work.

Early movement of the fingers is of extreme importance and should be urged from the beginning of treatment. After the splints have been cut down to a point below the elbow and pronation is again possible, a very good exercise is practicing upon the piano. In this series of cases massage has not been used in a sufficient number to draw any definite conclusions as to its influence on recovery of function. The impression gathered, however, is that its greatest benefit consists in relieving the myositis which develops in the muscles of the forearm, and even in those of the arm and shoulder.

In the above method of treatment I wish to lay great stress upon the fact that complete reduction is essential to a good result. There are many cases in which the fracture line is so serrated that this alone will prevent recurrence of deformity after reduction and the result will be good irrespective of the form of immobilization employed, hence the simple treatment of carrying the forearm in a sling, adhesive plaster band about the wrist, etc., advocated by different authors. There are, however, those fractures in which the fragments are similar in shape to those described above in which deformity will recur if the forearm is placed in pronation and the elbow left free even if complete reduction under an anesthetic has been obtained, and it is in this type of injury that the method here described appears to be of greatest value.

Summary and Conclusions.

1. The present methods of treatment of Colles' fracture leave something to be desired, as many of the results obtained in the hands of competent surgeons are unsatisfactory from both a functional and a cosmetic standpoint, and in some cases convalescence is unduly prolonged.
2. It would appear from a study of the surface form of the fragments and the action of the muscles upon them that there is a tendency toward recurrence of the deformity even after complete reduction of the fracture.
3. This tendency can best be overcome by placing the forearm in such a position as to lessen the strength of the pull of the muscles which reproduce the deformity and at the same time furnish an antagonistic muscle, and thus restore muscle equilibrium.
4. The position of the forearm, which fulfills the above indications, is that of complete supination, and therefore this would appear to be the logical position in which the forearm should be immobilized.
5. It is important to remember that supination of the forearm can be maintained only if the elbow is immobilized in addition to the wrist, and this can be accomplished by extending the splints above the elbow.
6. In the hands of the writer the above method used as a routine has afforded better results with less protracted convalescence than any other method heretofore employed.

REFERENCES.

1. Duchenne, G. B. Physiologie des Mouvements. Wernicke's translation;—Physiologie der Rewegunden. von Dr. C. Wernicke Cassel und Berlin, 1885. p. 262 and following.
2. Griffith, J. D. J. A. M. A., Vol. LXIV, No. 4, Jan. 23, 1915. p. 312.
3. Hotchkiss, L. W. Personal Communication.
4. Cotton, F. J. Dislocations and Joint Fractures. 1910. pp. 348-351.

THE TECHNIC OF PROSTATECTOMY,

CONSIDERATIONS BASED ON A SERIES OF 81 CASES WITHOUT DEATH BY THE USE OF THE TWO-STEP METHOD.*

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Prostatectomy has become such a well recognized operation and the various methods of operation have been discussed so frequently that I cannot hope to contribute anything new to the knowledge of the subject. I shall only review some of the steps essential in this class of cases if speedy and complete recovery is desired.

Indications for operation upon the prostate are becoming better understood. When a patient over 55 years of age develops frequent urination at night he ought to consult his physician who will discover whether his condition is one of partial retention with the residual urine which causes the frequency. If his consultant is competent he will advise surgical intereference in preference to catheter life. The mortality from the use of the catheter is so high that the most mediocre surgeon can make a better showing by operation. Patients leading a catheter life show one hundred per cent. mortality.

Squier has contributed statistics of patients under his care which show that the average length of life after the use of the catheter had been begun, is two years and eight months.

It is variously estimated that from 33 1/3% to 40% of all men arriving at 55 years of age will have prostatic enlargement—that from 10% to 20% will require surgical intereference to save their lives. Just as it is impossible for the cook when she places the dough in the tin to prophesy upon which side it may fall or rise so it is impossible to say whether the adenomatous growth will back towards the rectum or push in and obstruct the urethra. It is summed up by saying that it is not the size but the shape of the tumor which causes the obstruction.

After surgical interference has been determined upon there are two principal methods of choice—perineal and suprapubic. Thanks to the early work of Fuller and those who have followed him, we have two well-defined and recognized methods. Fuller and Freyer have developed the suprapubic route which has later been improved by Squier, while Proust abroad and Young in this country have been the leading advocates of the perineal route. Each method has its adherents. In the hands of experts like these men there is little choice between the methods with regard to mortality.

Various investigators have demonstrated that the prostate is not hyperthrophied but that the enlargement is an adenomatous growth which has squeezed the prostate to the sides making it form a sort of capsule round the adenomatous mass. This mass may be shelled out without damage to the prostate or the genital organs. In the suprapubic operation the mass is simply lifted out leaving intact the bladder, the sphincter and the posterior lobe which latter contains the ejaculatory ducts. Suprapubic prostatectomy is thus in one sense a conservative operation as it leaves the prostate, while it is radical in that in removes the cause of the trouble and leaves no chance for recurrence.

In the perineal operation the mass is attacked through the posterior lobe which contains the ejaculatory ducts and the structure involved in the nervous mechanism pertaining to potency. The incisions are oblique and are intended to avoid these structures but we know that there are many anomalies and the position of these structures is often changed by pressure of the growth.

During the past fifteen years the mortality in prostatectomies has steadily decreased in the hands of experts until large series of cases have been reported with a mortality as low as three per cent. These statistics do not apply to the wards of general hospitals where the mortality is nearer twenty-five per cent.

The low mortality obtained by experts we know is not based upon selected cases but may be largely attributed to their attention to the details, however small, of preparation and aftercare.

Every surgeon aims to have his patient in the best possible condition previous to operation. Various methods have been adopted such as frequent catheterization at regular intervals, the indwelling catheter in the urethra, and suprapubic puncture, the last being really akin to the two-step operation. Since it is impossible to accurately diagnose the resisting power of various patients I believe that a method should be etsablished in which the greatest safety is guaranteed to the patient and which will be so simple that any competent surgeon can follow it.

Previous to June, 1914, the suprapubic operation was to my mind the one of choice. During the preceding three months three patients of mine had died, all of whom as far as discoverable were fair, if not good, surgical risks. After hearing Pilcher report on his method I decided that if it offered my patients greater safety I would adopt it. Since that time I have used the two-step method on 81 patients without a death. The details of some of these cases will be referred to later.

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*Read by invitation at a meeting of the New York Urological Society, December 6, 1916.

In fatalities from prostatectomy, the kidneys having been damaged by prolonged back pressure, death results from two causes as a general rule: acute renal infection (the patient often being in a dying condition when the surgeon first sees him), or gradual obstruction of the renal function.

The patient is uremic, often complains chiefly of cardio-vascular symptoms and the prostate has been entirely overlooked. These patients are often seen just prior to the period of breaking down when their general appearance is so good that they are operated upon without fear, but they possess so little resistance that they die without making any fight. This class of cases require the utmost care and attention with shock and hemorrhage reduced to a minimum.

One man whom I had the good fortune to see, was brought to the hospital practically on a stretcher. He had been under the care of different physicians for a year for cardiac trouble and colitis, his prostate not having been suspected. After a suprapubic drain was inserted under local anesthesia, he was treated for eleven weeks for his cardio-vascular and intestinal symptoms, after which time his general condition was markedly improved and his prostatectomy was completed. He made a rapid recovery and in two weeks returned to his home in a neighboring city. He has since resumed his position as a banker and is in excellent health.

These cases, with gradually increasing back pressure, complain very little of their symptoms. In any large hospital where autopsies are obtained, it is surprising to find how many cases that show more or less prostatic obstruction with dilated ureters and damaged kidney pelvis, have been treated for other conditions, attention apparently never having been called to any urinary trouble.

In this series of 81 cases without a death—which is not a series of selected cases—every case that needed prostatectomy was operated upon. Some of these men would certainly have died if the one-step method had been used. One case experienced such severe hemorrhage following the primary cystotomy that he was almost exsanguinated before the hemorrhage was stopped by packing the bladder. One month later the second step was performed without any complication and the patient made an uneventful recovery.

One old gentleman was so run down and uremic that he was almost like a piece of Dresden china. We always feared he would break while being handled. However, four weeks after the primary operation he went through the second operation with much less shock than he suffered at the simple cystotomy. He made a slow convalescence, mainly because of home-sickness, was sent home while the suprapubic wound was still draining and there he promptly improved and the suprapubic wound healed up.

Still another man, fat, flabby, and with a marked cardio-renal involvement—whose pulse dropped to 50 and lower on slight provocation, could not have survived a one-step operation.

Such cases should be given every chance. They are so frail and have so little resistance that it is only by reducing shock and hemorrhage to the minimum that they can recover.

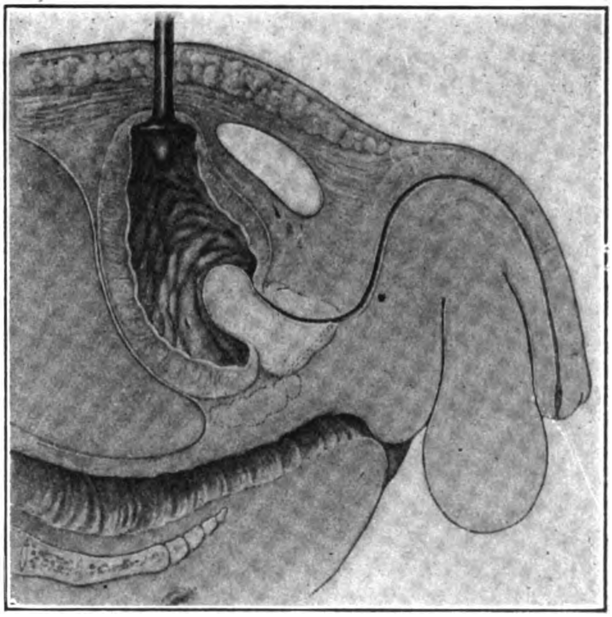

Fig. 1. Pezzer catheter in place after suprapubic cystotomy. This catheter makes a tight joint, is smooth and does not irritate the bladder mucosa. After Pilcher. (Courtesy of Annals of Surgery.)

In my series the ages of the patients were as follows:

50 to 59 years	3
60 to 69 years	48
70 to 79 years	26
80 to 85 years	4
	81

The average age was something over 65 years, the oldest 85 years and the youngest 54 years. Many of these men showed damaged kidneys from prolonged retention together with hardened arteries. As a rule they were poorly nourished and feeble, tired out from loss of sleep. The great majority had been leading a catheter life and had infected bladders. Calculi were present in nine cases (11%). In this series there was no incontinence of urine, no tearing of the rectum, no fistula that would not heal. The case that remained open longest (11 weeks) had a suture as a focus and after this came away the sinus healed. The average wound closure was four weeks after the second operation. This time was reduced in the latter half of the series when the indwelling catheter was used after removal of the Pezzer catheter which is usually done at the expiration of ten days.

The two-step operation, made prominent by Lilienthal, has been popularized by Pilcher through the use of the large mushroom or Pezzer catheter. The primary operation is performed under local anesthesia, the suprapubic opening being made high enough in the bladder, as suggested by Squier, to be just below the border of the peritoneum, and the Pezzer catheter slipped into the bladder through an opening around which a purse-string suture has already been placed. A tight joint is thus made, the wound heals quickly, and, if necessary, we may wait for a week, a month or three months, until the patient is in good condition before proceeding with the second step. In my opinion this method is far superior to frequent catherization or the indwelling catheter with its accompanying traumation of the urethra and the ensuing urethritis.

If there has been a dirty bladder and infection of the wound occurs, the patient can withstand the infection much better than if it were an added risk to a prostatectomy. Nature, in self-protection, lines this opening with granulation tissue, and as it is only necessary to stretch this opening in the second operation, there is little risk of infection in this tissue during the removal of the prostate.

The patient may now receive cabinet baths, bowel washes, and whatever attention is necessary to care for his vascular system or other complications. It is highly important that patients should sleep at night, and by this method they seem to thrive through their ability to make up for previous loss of sleep.

The cystitis, which is usually present, may now be treated by silver nitrate lavage two or three times daily. The rapidity with which severe cystitis will improve under this treatment is surprising and a patient who has been septic from absorption of toxic material will respond most gratifyingly in increased appetite and general well-being.

In cases that have never been catheterized and have a sterile urine, we have found that with the greatest care infection soon follows. A number of cases have been reported where fatal results followed the first catheterization. It is this class of cases with the chronically distended bladder, and urine of low specific gravity, and where no great discomfort is complained of, that is most dangerous.

Now that the patient has been given the preoperative care suggested, how are we to know when he is fit for the second operation? The answer is best obtained by looking at the general picture. The kidney, which the tests at first showed much diminished, has increased, the appetite is better, the urine output has improved and become nearly normal, either a polyuria has been reduced or a scanty urine increased. As the function increases the patient usually presents a better appearance. Personally I rely a great deal on the phenolsulphonephthalein test, but reliance should not be placed upon these tests alone because we know operations have been successfully performed when the output remained low. It is most assuring, however, if the figures increase and appear within normal limits.

During the period of preparation the patient usually is occupied in the morning with cabinet baths, etc., and is up and about during the afternoon, and sleeps well at night. These cases show a marked change after a week's care. They are being trained for a fight and the more thorough the training the greater the resistance in the final combat. When they are prepared for the second operation the most important part is over.

The second operation is performed under general anesthesia and the time consumed is very short. The opening is usually stretched to admit two fingers and the prostate is shelled out in four or five minutes. The shock from the anesthetic is almost nil. Probably as many patients have died from hemorrhage, which has been called shock, as from any other cause. Hemorrhage can be obviated in various ways: first, and most important, by keeping to the line of cleavage; second, after flushing out with hot water, by the use of the Hagner bag, the hemorrhage may be controlled by pressure; third, the cavity may be packed with a long strip of gauze, the end being brought out through the drainage tube, or an indwelling catheter may be left in the urethra for drainage, and packing made around the catheter; fourth, by sewing up the edges of the torn bladder wall. This latter procedure, which has been attempted by various operators and has been more time-consuming than the operation itself, has been much simplified by the adoption of an ingenious retractor by Dr. Danforth of the Mayo Clinic. The retractor is easily inserted in a small suprapubic opening and a running suture readily taken where the bladder wall has been torn in removing the prostate.

This usually controls the greater share of the bleeding.

The drainage tube should be of sufficient size so that it cannot be plugged by a clot. I prefer the Marion because of its stiff wall and also the small tube attached which can be used for irrigation. In closing the wound, figure-of-eight sutures of silkworm-gut should be used, leaving the ends of the sutures long next to the drainage tube. The less irrigation and the least disturbance of the bladder following the operation the better. If left alone a clot will soon form. When continual irrigation was used, we did not realize just how much bleeding there was and by our irrigation we inhibited just what we wanted to have take place.

If Hagner's bag has been used, it is better to wait forty-eight hours before removal. If packing has been used and the end brought out through the Marion tube, we may begin to remove the packing at the end of 24 hours, pulling out that part which is loose, and repeating about every four hours until all comes away. On the third day, as a rule, the urine is clear, or but slightly tinged. The large Marion tube may then be removed and a large size Pezzer catheter inserted. The ends of the figure-of-eight sutures which are left long, may now be tightened up, and the wound strapped with adhesive plaster to give it support. In another twenty-four hours the bladder will have closed sufficiently tight around the tube so that the patient is dry, can get out of bed and move around quite comfortably.

Patients should sit up in bed on the third day and be out in a chair for an hour or so on the fourth. Men of advanced age do not do well if confined to bed, and should be stimulated to help themselves by getting out of bed early.

At this time a cork may be inserted in the Pezzer catheter and the patient told to void naturally, but he must not try to distend the bladder. The Pezzer catheter is left in the bladder until the wound is solid, usually at the end of ten days. The tube is then removed and the fistula heals in a few days. The healing can be aided at this time by inserting an indwelling catheter, so that the bladder will not be distended.

The comfort of a patient who is kept dry following operation is incomparable with the former method of letting the suprapubic wound fill up voluntarily. Even if the dressings were changed every two hours, the patient lay in a wet bed most of the time and the odor was most offensive.

Authorities are agreed that the preliminary preparation is of the utmost importance, that the kidneys must be relieved from the prolonged back pressure and must adjust themselves to the new order of things before prostatectomy can be safely performed. The first step of the two-step operation offers, I believe, by its freedom from shock—half of the operation over without general anesthesia—a superior substitute for the indwelling catheter or frequent catheterization, with its often unavoidable trauma. When the patient has been put in the best physical condition, the second step consists simply in lifting out the adenomatous mass, which takes but four or five minutes. Briefly the superior advantages of the two-step operation may be thus expressed: Little shock, little hemorrhage, little time, little risk.

Have YOU interested the young physicians in your community, fresh from the hospital, in the medical needs of the Army and the Navy?

FRACTURE DON'TS.

Frank T. Fort, M. D.,
Louisville, Ky.

A rather careful scrutiny of available surgical literature fails to reveal a single recent contribution to the subject of "Fracture Don'ts." The importance of this subject was brought forcibly to my mind several years ago, while assistant in the clinics of the late John B. Murphy, where we had the opportunity of seeing many unfavorable results of improperly treated and neglected fractures, such as ischemic myositis, deformities and resulting necrosis from impacted fractures, almost functionless arms and legs from fractures near the neck of the humerus, from Colles' fracture, Pott's fracture, angulation of the femur and tibia from faulty adjustment, etc., all of which could probably have been prevented by the application of proper treatment at the time of injury, plus the co-operation of the patient who is often at fault.

The two most important underlying principles in the treatment of fractures may be stated as: (1) Correction of the deformity by proper reduction of the fragments; (2) Retention of the broken bones in correct anatomic position by suitable dressing or apparatus until union has occurred. There are three essential factors in the successful treatment of fractures: (a) mechanical ingenuity, (b) anatomic knowledge, and (c) conservatism fortified by experience.

I believe we should treat all injuries, where fracture is suspected, as a fracture, until the x-ray examination or the development of symptoms warrant the exclusion of fracture. It is my opinion, however, that the more conservative the surgeon is, the better will be his results; the operative work should be left for those who from experience and special adaptability are better qualified to secure favorable ultimate results,—I mean by this such procedure as bone plating, bone inlay, the use of nails, screws, etc.

Don't forget to dress a compound fracture in such manner that drainage can be instituted at any time, should the symptoms indicate or demand it.

Don't forget that the ability to correctly apply plaster of Paris dressings in the treatment of fractures must be acquired by every surgeon; it is not as easy and simple as one might think, it can only be learned by experience, the main objects being to secure fixation and rest without undue pressure.

Don't forget that a general anesthetic will cause muscular relaxation and facilitate the reduction of fracture in many instances where without its use reduction seemed impossible.

Don't attempt to apply any one kind of splint in a given fracture. Devise the kind of splint suitable for the individual case.

Don't forget to arrange all the fractured bones in their natural plane, with as much "muscle pull" removed as possible near the fracture site.

Don't forget that crepitus may be absent in: (a) riding of the fragments, (b) impaction of the fragments, (c) entire separation of the fragments, and (d) when muscle or blood clot is interposed between the fragments.

Don't forget that there is a pseudo-crepitus (very like true crepitus) in teno-synovitis, joint effusion, osteo-arthritis, and caries of joint surfaces.

Don't forget that in epiphyseal fracture the prognosis must be guarded, because such injuries in the young are sometimes followed by suspended growth or premature ossification followed by deformity.

Don't forget that in separation of the epiphysis (upper extremity of humerus and lower extremity of femur), the line of fracture is so broad that there may be no shortening, but the fragments may project.

Don't forget to at once examine the pulse at the wrist and ankle in fractures of the humerus and femur, to ascertain if an artery has been injured.

Don't allow a splint to press upon the skin sufficiently to produce ulceration or edema,—or what is worse,—gangrene.

Don't place a pad in the axilla or bandage the arm too tightly to the chest in fracture of the acromion, because the head of the humerus is thrown outward and may thus separate the fragments,—the head of the humerus is a natural splint in such fractures.

Don't forget to examine the shoulder joint in all fractures of the upper portion of the humerus, to ascertain whether the head is dislocated.

Don't begin passive motion too soon in fracture involving a joint, for it is likely to increase the formation of callus and thereby limit future usefulness of the joint; it is better to nail the fragments together and place the joint at complete rest.

Don't splint the palm of the hand in Colles' fracture; leave the fingers free so they may be "worked" after the second or third day, otherwise the tendons may become adherent where they cross the site of fracture and considerable time may be required to restore suppleness.

Don't make the diagnosis of "only a contused hip" in elderly people, without a careful and gentle examination (including the x-ray) to exclude impacted fracture.

Don't forget that rarely disintegration and absorption of the head and neck of the femur may occur in elderly persons as the result of chronic osteo-arthritis, which may simulate fracture in the shortening, eversion and osteophytic crepitus which are oftentimes present.

Don't use violence in attempting to elicit crepitus in hip fracture, as much damage may be inflicted by separating the impaction.

Don't keep elderly patients in bed trying to secure union in hip fractures; they are almost sure to develop pulmonary edema, pneumonia, sloughing from pressure of splints, or from bed sores, and nearly all of them die.

Don't forget to bandage the entire limb in fracture of the femur. I prefer the plaster of Paris cast reinforced with strips of tin, or the moulded plaster dressing. The splint should encase the foot, leg, thigh and pelvis, and a Buck's extension should be used.

Don't forget the danger to the popliteal artery from traction and extension in a transverse fracture of the femur above the condyle; an almost right-angle fracture box or splint is the best fixation dressing.

Don't place recent fractures in plaster of Paris without due regard to swelling; either place a wire saw underneath the circular plaster of Paris bandage, or cut it through from end-to-end when first applied, so it can be removed or readjusted when the swelling subsides; or what I like better in a great many fractures, apply moulded splints which can be made any shape desired while wet and can be removed much more easily than the circular type.

Don't forget that should severe pain develop within a few hours after a splint has been applied, the splint is either too tight from swelling, or the fracture has not been properly reduced,—excepting in cases where a severe sprain complicates the fracture; if pain is caused by swelling and the splint be not removed, within a few hours degenerative changes are likely to occur in the muscle-cells which may induce ischemic myositis or (in the forearm) Volkmann's contracture. I have seen four or five such cases.

Don't forget to suspect degenerative changes due to syphilis, central sarcoma or other pathologic process producing friability of the bone, when fracture is produced by stepping upon a pebble or other slight violence.

Don't forget that in such instances there is usually a certain degree of anesthesia of the soft structures of the involved limb, and it may be difficult to prevent the patient walking too soon if a leg is fractured; and if the fracture is near a joint the condition may resemble a Charcot joint.

Don't fail to have an *x*-ray plate made in all fractures where perfect reduction seems doubtful, and this means nearly all of them; it is a valuable means of confirmation, and may be of great benefit to the surgeon should the result be unfavorable.

Don't attempt to plate a recent compound fracture, otherwise amputation will most likely be the inevitable result.

Don't use a plate in any recent fracture (week or ten days) until all means at hand have been exhausted in attempted reduction.

Don't forget that in plating or inlay work the strictest asceptic technic must be used, not even the gloved hand should come in contact with the wound or the wound-touching portion of the instruments.

Don't place too much reliance upon the *x*-ray plate in suspected fractures near the shoulder joint, and in fractures at the angle of the lower jaw, as good pictures of these localities are difficult to obtain.

Don't forget that painful passive motion is always harmful where fracture involves a joint.

Don't forget in placing any kind of a splint around or to the outer side of the knee, to pad well over the head of the fibula, as pressure is likely to injure the peroneal nerve, producing paralysis of the muscles supplied by it.

Don't forget to pad liberally under the heel of any splint that envelopes the foot, as pressure necrosis sometimes occurs. I have seen one such case in consultation following fracture of the patella, and healing was delayed for several months.

Don't forget to pad well over all bony prominences where splints have to be adjusted over them.

Don't forget that a burning sensation in the heel or other parts underneath a splint signifies that too much pressure is exerted; the splint should be immediately removed.

Don't forget that unless a fracture is complicated by a sprain, or severe contusion, when properly reduced and splinted pain should cease.

Don't forget the danger of injury to the anterior crural nerve in fracture of the true pelvis, since the fracture is most commonly through the ascending ramus of the os pubis at or near the point where the nerve crosses the bone; it is also likely to be injured in fractures and dislocations of the femur.

Don't forget that in fracture of the humerus there is danger of the musculo-spiral nerve being torn, and there is also danger of callus from the fracture interfering with the nerve.

Don't forget that in shoulder injuries complicated by dislocation, it is best not to attempt reduction of the dislocation until it has been ascertained no ribs have been fractured, for great damage might be inflicted upon the lung tissue should there be a broken rib.

Don't give a too favorable prognosis in any cranial fracture, for one never knows the extent of the crack in the skull, and infection may develop many days after the injury.

Don't forget that the auditory and facial nerves are frequently injured in fracture involving the middle fossa of the base of the skull and implicating the internal auditory meatus; when the nerve is divided permanent deafness will result.

Don't forget that the sixth nerve is more frequently involved in fractures of the base than any other cranial nerve, paralysis of which produces convergent squint.

Don't forget that in fractures of the skull the patient may present no evidences other than those of concussion for days or weeks, and then suddenly develop symptoms of an alarming or fatal character. One such case might be mentioned: A man was rendered unconscious by falling from a car and was taken to a hospital. There were no discoverable evidences of cranial fracture or local brain injury, and the next day as the patient was feeling perfectly well he was discharged from the hospital. He continued well for two weeks, then suddenly died. Autopsy revealed a transverse fracture extending the entire width of the middle fossa.

Don't forget when a person is found unconscious, with paralytic symptoms, with or without scalp wounds, it is not always easy to determine whether the coma is apoplectic in origin, due to an extreme degree of intoxication, or the result of cranial fracture.

Don't forget that while the *x*-ray is not infallible, it is an invaluable diagnostic aid and should be used in all fractures, regardless of the anatomic situation, both before and after reduction.

Don't forget to carefully watch the patient suffering from fracture of the shaft of the femur dressed with circular plaster of Paris, as it may become loose from recession of the swelling; the patient may so rest in bed that his foot and leg may turn in the plaster and inversion or eversion of the foot occur.

Don't forget to be very careful in the remarks you make to the family or the patient who has a bad result following fracture, lest you be haled into court to testify against a brother doctor or practitioner. I once heard a prominent lawyer say that doctors themselves were responsible for the majority of suits for malpractice.

Don't forget that the majority of suits for malpractice have their origin in imperfect functional results or visible deformities following the adjustment of fractures; therefore in complicated cases the possibility of future impaired function should always be explained to the patient in the presence of competent witnesses.

Don't forget in ambulatory fracture of the lower extremities where crutches are necessary, to give the patient a good fit and pad the crutches well so as to prevent crutch paralysis from pressure upon the musculo-spiral nerve.

FINALLY: Don't forget that eternal vigilance is the price of good results in all fractures.

HEXAMETHYLENE TETRAMINE ("UROTROPIN") AS A FUEL.

There are many times when the physician needs a small, hot, sootless flame such as produced by an alcohol lamp, when he is out of reach of any such article. It is not generally known, I believe, that hexamethylene tetramine will give exactly this kind of flame when ignited. Two five-grain tablets such as are often carried in the physician's medicine case, will give a clean flame of sufficient heat to boil 5 c.c. of water in a test-tube within 30 seconds, and of sufficient duration to keep it boiling for two minutes. For boiling needles or small instruments, sterilizing water for hypodermic injections, testing for albumin by the heat-and-acid method, and many other similar purposes, this "extemporaneous technique" may be found useful.—Lowell C. Frost, in the *Medical Record*.

THE CANCER CAMPAIGN QUARTERNARY: THE PROBLEM; THE PUBLIC; THE PATIENT; THE PHYSICIAN.

William Seaman Bainbridge, A.M., Sc.D., M.D., C.M.,
New York City.

(*Continued from the April issue*).

Whatever may be our individual interpretation presented by experimentation or by clinical observation, we have *no* incontrovertible facts to give to the layman who seeks enlightenment concerning the cause of this disease. We may have some negative findings; we may assert positively that cancer is or is not due to any kind of a parasite, microscopic, ultra-microscopic, or macroscopic; we may persistently deny that diet, of whatever kind, is potent to initiate the malignant process; we may agree or disagree concerning the proposition that cancer is or may be inherited; and we may accept or decline the oft-repeated statement that cancer is local in its beginning, and not in any sense a constitutional disease.

No matter what position we may assume with regard to the etiology of cancer, an army of opposition may be marshalled against us, equipped with apparently just as invincible weapons as we possess; for, truth to tell, neither side is really fighting, so far as the cause is concerned, with the impregnable armor of fact. Neither side, therefore, can vanquish the other. Even though one side may marshall seventy-five of a hundred thousand rats and mice against seventy-five or a hundred human subjects, in a contest of theories, who can say that either mice or men have won a victory?

How soon the smoke of battle may clear away and leave us and our allies, mice or men, triumphant, nobody can say. We can but hope that this consummation devoutly to be wished may soon be fulfilled. In the meantime, let us continue, in the laboratory or in the clinic, to fight for the possession of facts which will clear up this fundamental question—the cause of cancer. Pending the successful culmination of these efforts, how shall we interpret to the public Nature's "whispers" which come in answer to our investigations into the beginnings of this puzzling disease?

A few years ago, when so much was being said within the medical profession and in the secular press concerning the contagiousness and infectiousness of cancer, many of us were constantly confronted with anxious queries along this line, and with the serious and unfortunate difficulties which arose in the care of patients with advanced cancer.

We have not forgotten the urgent demands made by some of the radicals for the burning of clothing, bedding, and even houses in which patients with cancer had lived, nor have we forgotten the unwillingness and refusal of nurses and other attendants to take care of these unfortunates. This theory of the cause of cancer, like the poor, we have always with us, and this dread possibility, that after all, the disease may be transmitted from man to man, from animals to man, or even from plants to man, figures at times, in one way or another, in the literature concerning malignant disease. The theory has not been proved, nor has it been universally accepted as disproved.

What, then, is it safe to affirm, in this connection, in the promulgation of knowledge regarding cancer? All, it seems to me, that need be said is:

(1) That the contagiousness or infectiousness of cancer is far from proved, the evidence to support this theory being so incomplete and inconclusive that the public need have no concern regarding it.

(2) That the communication of cancer from man to man is so rare, if it really occurs at all, that it may be practically disregarded.

(3) That any relationship between cancer in animals and in plants to cancer in man, so far as the acquirement of the disease by man is concerned, is purely an academic question, an hypothesis so far from verification that even the "whisper" of it should not reach the public.

(4) That those members of the public in charge of or in contact with sufferers from cancer with external manifestations, or discharges of any kind, need at most take the same precautionary measures as would be adopted in the care of any ulcer or open septic wound.

(5) That in the care of patients with cancer there is much less danger to the attendant from any possible acquirement of cancer than there is of septic infection, or blood poisoning from pus organisms.

Of all the theoretic ghosts that stalk through the realm of cancer, however, the veritable Banquo's Ghost, refusing to be downed, is the ancient Constitutional Theory of the origin of this disease. It followed close upon the Evil Eye, the Curse, and other primitive ideas of the cause of disease, and it looms more or less vividly upon the horizon, its vestments varying with the times or with the "spotlight," cast upon it. Hand in hand with this ghost goes another, just now,—Heredity, an unintentional ally.

The combination is not an easy one to combat in the campaign of education, for a bewildering array of facts, figures and fiction have been collected by the supporters thereof. To be sure, the facts are not fundamental ones, the figures may be impugned as may all statistics, and the fiction is as interesting as any other fiction concerning this homely subject; the serious import thereof, however, has a bearing upon the treatment of the disease, as we shall see, and hence upon the campaign of education as applied to the layman. It is important, therefore, that a rational stand be taken concerning these theories of the origin of malignant growths by those who are earnestly endeavoring, without preconceived and biased views, to instruct the public in the matter of the eradication of this scourge. Is it not enough, then, to teach, in effect:

(1) That the hereditary and congenital acquirement of cancer are subjects which require much more study before any definite conclusions can be formed concerning them, and that, in the light of our present knowledge, they hold no special element of alarm.

(2) That in cancer, as in all other disease, attention to diet, exercise, and proper hygienic surroundings, is of distinct value, aside from any consideration of the essential cause of the disease.

(3) That suggestions which are put forward from time to time regarding the eugenic, dietetic and other means of limiting cancer, should not be accepted by the public until definitely endorsed by the consensus of expert opinion. Such consensus *does not exist* at present.

(*To be continued*).

Acute Mammary Carcinoma.

Generally speaking, if an acute mastitis does not tend to clear up within ten days from the commencement of the disease, effort should be made to distinguish between this and the acute form of carcinoma. Both may begin with a localized area of redness and induration. In the former case, the nipple will usually be found to be the source of the infection. A rapid diffusion of the disease through the gland is noted in the latter case. The skin assumes a light or dark red color over its surface. Early axillary gland involvement may be seen in both cases and is not of great diagnostic importance in differentiating these conditions. Retraction of the nipple should be carefully looked for, though not present in all cases, is of great importance. The peculiar stony hardness, an induration due to infiltration of the tissues, usually both superficial and deep, is of the greatest importance in distinguishing these conditions and should be carefully sought.—M. E. Larmouth, in *The Canadian Medical Association Journal.*

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, MAY, 1917.

Wake Up, Colleague! Your Country Needs You!

Our peaceful country has at last been forced to take part in a war that has been thrust upon it. To assert our national dignity and maintain our national respect, is a high purpose that ought to rouse the patriotism of every American. A cause as just as ours cries out itself. For provocations much less we warred against England in 1812.

But there is at stake far more than the assertion and preservation of our national rights. This is not a mere quarrel among nations; it is not now only a war for supremacy in commerce or dominion. It is a clear-cut issue between militaristic autocracy and peaceful democracy. The divine right of kings and the iron rule of military caste, in their last weakening citadels, have arrayed against them the mighty force of the world's freemen. It is a fight to the end to determine for all time that individual liberty, not mass efficiency, is the measure of governmental benevolence. It is the old war, the greatest and perhaps the last of all the many wars for liberty and political equality, for which men have bled and died, and made glorious history.

Such a cause must stir in every fiber Americans proud of their country's history! It is a purpose larger than that of the American Revolution, which made us an independent republic instead of an autonomous colony of a democratic monarchy; an issue greater even than that of the Civil War, which continued us as one nation rather than two. The great conflict in which we are now engaged is a war for the democratization of the world, a war for peace!

We are passing through one of the great epochs of history, one of the mightiest struggles of civilization. It is a privilege to live in such an epoch; it is a duty to help the right in such a struggle!

Our loved country, greatest of the republics and chief exemplar of democracy, has joined the Allies against the common foe, and all its wealth of men and money and resource is pledged in honor with them to fight on, for years if need be, until the inevitable is achieved and the great Teutonic peoples are blest, as we are, with the control of their own government. That this may come, through internal dissension and the pressure of the Allies, before we can marshal our forces on the battle line, we must not assume. We cannot stand by while others fight out the struggle in which we too are now concerned. We must provide and, indeed, the administration is carefully planning, the rapid expansion of our sea power and merchant marine, and the training of a large army. Both of these undertakings throw a heavy responsibility upon the medical profession. Thousands of physicians will be needed for active service. They will be needed in the navy yards, on war, transport, and hospital-ships. In the army they will be needed in recruiting depots, training and concentration camps, in ambulance companies, field- and base-hospitals.

An army of one million men ought to have not less than seven thousand medical officers; there are but a few hundred in our regular army now. With the recent additions to the Medical Officers Reserve Corps it still numbers, we believe, much less than two thousand; it should be increased to twenty or thirty thousand. National Guard increments to be added to the federal force will need, of course, their proportion of medical officers. Dr. Frank F. Simpson, Chief of the Medical Section of the Council of National Defense, announces that about 350 additional officers are needed for the Naval Medical Corps, and several hundred for the Coast Defense Reserve Corps of the Navy.

The profession has been made fairly familiar with these needs through the newspapers and through the activities of the local (state and county) committees of the National Committee of American Physicians for Medical Preparedness. In this great world crisis upon which we have entered, it is the duty of every physician in the country to take stock of his talents and experience, of his physical fitness and his obligations, and to determine whether by reason of his age, his health, the demands upon his earnings or his indispensibility in his community, he should remain at home to serve that community or give his services to his country elsewhere. Only young men are eligible to commission in the regular army Medical Corps, but in the Medical Officers Reserve Corps the age limit is fifty-five, and all physicians not older than that who are in good standing and of good health and have had proper clinical or laboratory experience will be welcome. Many of the older men of the profession, men of eminence and men of humbler reputation, are enrolled in the Medical Officers Reserve Corps and stand ready to be called, or have already been called, to active service. This should inspire their colleagues. It is especially our duty, both by example and by argument, to urge upon the young men just completing their hospital interneships, their immediate obligation to the country. They are most needed now. Service in the army for these young men, well trained, and as yet unembarrassed by the responsibilities of a practice and the support of a family, is not only an evident duty, it is a brilliant opportunity. Aside from the experience, a junior medical officer in the army (or the navy) receives $2,000 a year and "quarters"—which is more than most men earn their first year or two in medical practice. There is now an excellent opportunity for young physicians to enter the army, with exceptional prospects of early promotion. Those, however, to whom the career of an army surgeon does not appeal, should join the Medical Officers Reserve Corps, in which organization they would have no obligation to serve after the war without their consent.

Application blanks and full information can be secured by writing to the office of the Surgeon General of the Army, Washington, D. C. In those states, however, in which Medical Reserve Corps Associations have been formed, the officers of those associations have been empowered to receive and forward applications and to conduct physical examinations.*

Jonathan Letterman, medical director of the Army of the Potomac, conceived and established what is, essentially, still the system of caring for the wounded in battle. The greatest working medical library in the world, the greatest index of medical literature, are the monuments to an American army surgeon, John Shaw Billings. In peace and in war, the regular and the volunteer military surgeon, have written their names into American history and into the great accomplishments of American medicine. The profession today is ready, we are sure, to carry on the traditions that it has inherited. It has, too, the unique and comforting distinction that its country's call is not to destroy life but to preserve it.—W. M. B.

AMERICAN MEDICAL EDITORS' ASSOCIATION.

The annual meeting of the American Medical Editors' Association will be held at the Hotel McAlpin, New York City, June 4th and 5th, 1917, under the Presidency of Dr. George Morris Piersol, Editor of the *American Journal of the Medical Sciences.*

A very interesting program is now being prepared, and it is expected that the forthcoming session will be the largest in the history of the Association.

The forty-eighth anniversary of this society will be celebrated by a banquet on the evening of June 5th, at the Hotel McAlpin.

The meeting will be coincident in time and place with that of the American Medical Association.

The United States has joined the world war for democracy! YOUR help is needed.

Surgical Suggestions

Morphine is a life-saving drug in certain surgical complications. In post-operative pulmonary edema or congestion, for example, it usually accomplishes more than a whole battery of alkaloidal stimulants. In all other acute, threatening post-operative conditions in which the patient is restless, anxious, distressed, morphine, again, is of the utmost value, for it dulls the sensorium, stimulates and steadies the heart and brings the relief of often much-needed sleep.

Spina bifida occulta may exist without the usual external manifestations (lipoma, hypertrichosis). A bifidity in the lower lumbar or sacral arches is a not uncommon find in *x*-ray pictures of individuals who have no cord symptoms whatever. But it is also occasionally seen in those who have such cord symptoms as bladder or rectal incontinence or perforating ulcers of the foot, but no supraspinal lipoma, hair growth or nevus. An *x*-ray picture, therefore, may sometimes reveal the cause of a trophic disturbance, even when physical examination fails to do so.

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*The president of The N. Y. State Medical Reserve Corps Association is Major Henry C. Coe, M.O.R.C., 40 East Forty-first Street, New York City. New Jersey physicians may secure application forms from the president of the Medical Reserve Corps Division of that State, Major David Kraker, M.O.R.C., 236 Broad Street, Newark, or the secretary, Captain Joseph MacDonald, Jr., M.O.R.C., East Orange.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

MOBILIZING THE MEDICAL PROFESSION.

The Council of National Defence is charged with the responsibility of coordinating the industries and resources of this country for the purpose of developing national security and promoting the general welfare. The medical profession is represented by Franklin H. Martin of Chicago on the "Advisory Commission to the Council," who thus becomes the chairman of a medical committee consisting of the Surgeon-Generals of the Army and Navy and the Public Health Service, together with the presidents or other high officers of numerous national medical organizations. For purposes of convenience a national committee was created by the Presidents of the American Medical Association, the American Surgical Association, the Congress of Surgeons of North America and the American College of Surgeons. By this centralized body, state committees were appointed which in turn are to select county committees whose specific efforts will be directed to the correlation of medical interests and activities with a view to building up a systematic plan of medical defence for the nation. The county committee becomes the unit agent to which duties are to be assigned by the higher administrative officers.

In the process of mobilization of American physicians many vital steps must be taken to secure the effectiveness of this branch of the military service without sacrificing the welfare of the industrial and civil population whose needs are not to be disregarded. A vast amount of work is requisite to coordinate the civilian physicians into a readily mobilizable adjunct of the army and navy.

Merely recruiting the physicians into the Officers' Reserve Corps fails to provide an adequate measure of medical defence. Cataloguing the activities of enrolled physicians according to their training, capabilities, interests and desires for service is as essential an inventory of medical strength as is an inventory of hopitals, convalescent homes, laboratories, dispensaries and social agencies available in meeting all possible contingencies during a state of actual warfare.

Insufficient stress had been placed upon the training of these men at present being enrolled into the Officers' Reserve Corps. The men formerly belonging to the Medical Reserve Corps have been taken over into the Officers' Reserve Corps. In offering commissions at the present time physicians who have hitherto devoted no time to the consideration of the problems of military medicine are receiving appointments which actually give seniority of rank over those men who for the past few years have been giving themselves to the organization and up-building of a useful medical reserve corps. The only type of medical officer who can be of maximum service at this time is the trained officer. To scatter throughout the army physicians whose chief claim to rank lies in the fact that they possess friends of political weight is to weaken the system of appointment and to decrease the enthusiastic support of those whose inclinations, interests, and desires have been manifest during several years.

It may be urged that many of the physicians to be appointed to the medical reserve will have achieved their honors as the result of examination. Book knowledge, however, cannot outweigh the practical experience of those who possess familiarity with the organization and duties of the medical department of the army and navy.

While it is true that the diseases of soldiers do not differ particularly from those existent in civil life and while the surgical procedures requisite for the care of the wounded vary principally in degree and severity, and treatment must be altered by the exigencies of military operations and limitations, the civil training of physicians does not afford the type of education productive of an efficient medical officer for the army or navy. Book knowledge alone is insufficient to afford the initiative and resourcefulness required for caring for the health of troops in camps or on the march. It fails to yield a confident and capable administrator of ambulance companies, field hospitals, evacuation hospitals, quarantine stations, medical supply depots or laboratories. Few men today are enrolled with adequate training to inspect and supervise the quality of food and water or to exercise military judgment in rationing an army, though of course the latter is largely dependent upon the efficiency of the commissary department. Numerous problems involving medicine, surgery, sanitation and hygiene arise wherein the medical officer becomes the authoritative advisor of the officers of the staff and the line.

During time of peace an army medical school has been maintained for the purpose of affording necessary instructions to the officers of the medical department, who are all graduates from medical schools. If during the time of peace such careful training is deemed of importance, how much more serious does this training become in the face of an actual need for efficient medical officers.

The Manual of the Medical Department officially states the duties of the medical department to be "the institution of sanitary measures to preserve the health of the troops and inhabitants of occupied territory, the care of sick and wounded, their transportation, etc., in the order named." This simple description by no means indicates the duties with which medical officers must acquaint themselves.

It would seem imperative that the mobilization of medical officers should be prompt in order that a campaign of education might be instituted at once to develop the personnel capable of performing the services required and demanded. The appointment of medical officers should be made at once and duties should be assigned immediately with a view to securing familiarity with the numerous forms of red-tape with which administrative work is always tied. It would not be necessary to insist upon full time service until the actual need arose to be of service. The Government should begin the training of the physicians with a view to making them more useful in the national defence.

It is obvious that the utilization of a large number of physicians along military lines will require a redistribution of physicians in order to maintain upon a high plane the medical and surgical service necessary to meet the demands of the civil population. Modern wars are no longer fought by personal combat, but depend upon the organized fighting of nations. The supplies to be used by the military and naval forces can be forthcoming only by the maintenance of the health and welfare of the industrial forces engaged in their manufacture. A plan of medical preparedness which fails to take cognizance of the quasi-military needs of the general population may lead to dangerous undermining of the general welfare of the nation and actually weaken its resourcefulness and military strength.

In order to effectively prepare the nation along medical lines every physician should be called upon for service to the nation in some capacity, however humble and seemingly insignificant.

In the scheme of "medical preparedness," in the "mobilization of the profession," where can YOUR training and experience be used to most advantage?

Book Reviews

International Clinics. A Quarterly of Illustrated Clinical Lectures and especially prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Ophthalmology, Otology, Rhinology, Laryngology, Hygiene, and other topics of interest to students and practitioners, by leading members of the medical profession throughout the world. Edited by H. R. M. Landis, M.D., Philadelphia. *27th Series*, 1917. *Volume 1*. Octavo, 305 pages; illustrated. Philadelphia & London: J. B. Lippincott Company, 1917. $2.00.

This issue of *International Clinics* contains a 100-page review of the progress of medicine (including surgery) during 1916 by Frank A. Craig and John Speese, of Philadelphia; and the following original articles: The Medical Treatment of Gastric and Duodenal Ulcer, by B. B. Vincent Lyon; The Treatment of Epithelioma by Radium, by Russell H. Boggs; The Medical Treatment of Poliomyelitis, by Curran Pope; Syphilis as an Etiological Factor in Laennec's Atrophic Cirrhosis of the Liver, by Douglas Symmers; Personal Researches on the Nature of Chloromata, by Max Askenazy; On Aneurismal Obstruction of Vena Cava Superior with Special Reference to the Caval Syndrome, by P. G. Skillern, Jr.; Some Adenomatous Tumors of the Abdominal Viscera, by F. Parkes Weber; The Electronic Reactions of Abrams, by Albert Abrams; Acne Necrotica, by Frederick Gardiner; The Tangled Skein (Neglected Psychopathics), by J. Madison Taylor; A Study in Superstition, by J. P. H. Murphy; Health Efficiency of Workers due to their living conditions, by H. R. M. Landis; The Treatment of Dislocations and Fractures of the Outer End of the Clavicle, by F. M. Cadenat; Local Anesthesia in Surgery of the Colon and Rectum, by William M. Beach; and Congenital Talipes Equinovarus with Report of a Case of Bilateral Symmetrical Talipes in Twins, by William Barnett Owen.

An Inquiry Into the Principles of Treatment of Broken Limbs. By William F. Fluhrer, M. D., Consulting Surgeon to Bellevue and Mount Sinai Hospitals. Octavo; 128 pages; illustrated. New York: Rebman Company, 1917.

Those who enjoyed the privilege of working with Fluhrer at Bellevue or Mount Sinai Hospital many years ago carry with them a lasting impression of his skill, his remarkable patience, his courteous manner, his distinctive personality. This publication recalls to mind his various contributions to surgery—his tin-strip method of rapidly immobilizing fractures, his technique of urethrotomy for stricture, his early prostatectomies, the Fluhrer probe, the Fluhrer tunnelled-probe-pointed-director catheter, Fluhrer crochet bone drill, etc.

Some of these inventions are referred to in this book. The author calls it "a philosophico-surgical essay." It is also written in a spirit of reminiscence, in which respect, too, it is very interesting.

The greater part of the book is devoted to a description of the tin strip method of fracture immobilization devised by the author in the early seventies, and to the principles that underly it. Added to this are "Surgical Notes" upon other subjects, e. g., a description of the manner in which Fluhrer abolished septicemia in two New York reception hospitals—a vivid picture of conditions in Bellevue Hospital in pre-antiseptic days; a discourse upon the management of septic wound complications; the considerations of increased "scope" that led him to devise some of the surgical instruments above referred to.

Fluhrer's tin strip method of splinting fractures is a most useful and practical procedure that every surgeon should be familiar with. To those who are not we commend the reading of this philoscophico-surgical essay.

Surgery, with Special Reference to Podiatry. By Maximilian Stern, M. D., and Edward Adams, M. D., Professors of Surgery, School of Chiropody of New York. Edited by Maurice J. Lewi, M. D., President, School of Chiropody of New York. Octavo; 278 pages. New York: The School of Chiropody of N. Y., 1917.

This volume is the first of a contemplated series of books to comprise "a system of podiatry," for students of chiropody.

It is a well-conceived manual of surgical principles and of such elementary surgery as is desirable in the instruction of chiropodists. Physiological, pathological and bacteriological fundamentals, general surgical methods and specific procedures are set forth very succinctly and very clearly.

American Public Health Protection. By Henry Bixby Hemenway, A. M., M. D., Author of The Legal Principles of Public Health Administration, etc. Octavo; 271+12 pages. Indianapolis: The Bobbs-Merrill Company.

The protection of the public health is no longer an academic question. It is a practical problem, the solution of which lies within the power of the general public. Unfortunately, our medical schools give inadequate attention to the science of prophylactic medicine, though in a few institutions courses in public health have been instituted in recognition of the general need for such information in the medical profession.

The purpose of the author is to make manifest his idea as to what a health department should be. He does not offer a manual of hygiene but a careful consideration of the practical questions involved in establishing public health work upon a sound rational basis that will advance the interest of government and citizenry.

After discussing the history and development of public health service through departments in the United States, the author points out that the great failure in health administration has been the lack of adequate compensation for those serving the public in advisory or direct capacity as health officers.

He recognizes that the national government had until very recent times taken few steps for the protection of the health of the citizens. He properly notes that individual States acting under the police power enact conflicting health laws which cannot be harmonized or have not been harmonized through any national health department.

His discussion of the existing national health agencies is well presented and points out the advantages and disadvantages of the lack of harmony or co-operation among these various national departments.

The general basis of his book depends upon the recognition that sanitation and hygiene has become a separate profession, and that medical practitioners have not had the training to warrant them to become authorities on modern sanitation. He demands for the public health worker training in zoology, sociology, sanitary engineering, veterinarian medicine, vital statistics, and public health juris-prudence, all of which are involved as important portions of the public health official's education.

There would be general agreement with his demand that medical practitioners serving as public officers of health should receive adequate compensation and should not be expected to sacrifice himself, his family, or his practice without a proner quid pro quo.

The chapter dealing with Social and Economic Conditions points out the various changes which have influenced public health work health administration and the development of laws relating to the medical profession and the laity as factors in securing a higher standard of public health service. Similarly, he discusses in a virile way the changes in health administration required by the advances in medical science, particularly as related to malaria, typhoid fever, and the numerous infections transmitted by animals.

His demand for medical inspection of schools with an increased efficiency on the part of the inspectors is a reasonable forecast of what is to be expected within a comparatively few years. The point of view that inculcation of health is to be the basis of school work is far more acceptable than the present theory that the function of the medical inspector is merely to discover diseases.

With the acceptance of Dr. Hemenway's demand for a thorough, complete and scientific organization of health departments, there is naturally involved the readjustment of former conditions, wherein the preparation of health officers becomes of serious importance. His demands upon our State universities to aid in the work of educating our guardians of health merits serious attention. It may shock physicians to read "as a rule little assistance can be reasonably expected from medical schools," "the degree of doctor of public health should never be considered as an additional degree in medicine."

His conclusion that public health is a new science and a new profession is undeniable, and his presentation of his reasons therefor in book form may be regarded as a distinct contribution to the theme which he has made the title of his excellent discussion.

The Bulletin of the Department of Public Charities, City of New York. Vol. 1. No. 1. October, 1916. $2.00 per year.

This is the first issue of a quarterly scientific bulletin published by the Department of Public Charities, New York City. It is devoted to articles by members of the attending and resident staffs of the various hospitals in the department, and is edited by Dr. Orrin S. Wightmann.

What to Eat and When. *Fourth Edition.* Duodecimo; 366 pages; illustrated. **Let's Be Healthy in Mind and Body.** Duodecimo; 334 pages. **The Woman Worth While.** Duodecimo; 217 pages. By SUSANNA COCROFT. New York: G. P. PUTNAM'S SONS, 1916. Per set, $3.95, postpaid.

These three volumes by Susanna Cocroft, exponent of physical culture and widely known in her very useful sphere, make excellent reading for the laity and may well be recommended by the physician. The title of What to Eat and When, now in its fourth edition, explains its contents. Let's be Healthy in Mind and Body describes for the layman some of our various physiological processes, and the means for avoiding their abuse of those functions. The Woman Worth While ought to help the "nervous," irritable, unhappy female who has no system in her housekeeping or in the care of her children and finds little joy in either.

Progress in Surgery

A Résumé of Recent Literature.

Lesions of the Fifth Lumbar Vertebra.. L. C. KINNEY, San Diego. *Medicine and Surgery*, March. 1917.

According to Kinney, the fifth lumbar vertebra is subject to many congenital anomalies; e. g., partial or complete fusion with the sacrum; Enlargement of the transverse processes and articulation with the sacrum or ilium or both, etc. These abnormalities render this vertebra peculiarly liable to injury, and especially the ligaments of this vertebra. When such injury occurs, a disability follows, which is peculiarly liable to be persistent. Kinney reports four such cases. The paper is inconclusive in regard to the proper treatment of such cases. In addition to the plaster jacket, the author suggests surgical measures, which, however, were not carried out in his cases.

Chronic Medullary Abscess of the Long Bones. Its Clinical and Roentgenographic Features. Its Treatment by Simple Trephining. WALTER M. BRICKNER, New York. *Annals of Surgery*, April, 1917.

The literature reveals but few references to any type of chronic bone abscess other than that of the bone substance itself (cancella) generally known as "Brodie's abscess." Very few authors indicate—and some of them only vaguely—that there also may occur a chronic accumulation of pus, large or small, wholly within the medullary cavity.

Brodie's abscess of the bone substance, is readily recognized in the roentgenogram as a translucent area surrounded by the shadow of dense bone. In the region of the abscess this productive ostitis may cause much thickening of the bone, and often associated with it is a localized periostitis. The *medullary* abscess, like acute suppuration of the bone marrow, can not be recognized, as such, roentgenographically. The roentgen ray appearance is that of an osteo-periostitis or of a bone that has been the seat of an osteomyelitis. Although the diagnosis therefore can not be made by the roentgenographer, it can be made by combining his findings with the clinical observations. A suggestion for a roentgen ray diagnosis can be found in the character of the ostitis as it appears in the picture; when the abscess is medullary there is sometimes but little external thickening of the bone; the ostitis then spreads centripetally, encroaching upon and sometimes in one or more places completely obliterating the medullary cavity. This internal thickening is by dense dry bone. Such an ostitis or osteo-periostitis when, by its appearance or otherwise, syphilis can be excluded, and when there is no evidence of necrosis or cortical abscess, would justify the roentgenographer in suggesting the possibility of pus in the marrow cavity.

The chronic and medullary abscess of a long bone, uncomplicated by any active process, is not associated with fever, in the author's experience.

The sole symptom is severe, more or less continuous pain in the affected portion of the extremity. This pain may radiate, as from the arm into the forearm or from the thigh into the leg. It may thus be mistaken for neuritis; and for "neuritis" or "rheumatism" these patients may be treated for a long time before their condition is recognized.

The sole constant objective finding is localized bone tenderness. There may be palpable bone thickening.

The roentgenographic appearance is that of an osteoperiostitis or that of a former osteomyelitis.

This triad-severe pain, localized bone tenderness, and the roentgen picture—make the diagnosis of chronic medullary bone abscess, if the patient is afebrile. The same pain and tenderness are produced by a chronic abscess of the bone substance, but the roentgenographic appearance will distinguish it.

The clinical course of such a medullary accumulation of pus is essentially chronic. It would seem that it causes neither fever nor prostration. The productive ostitis or osteo-periostitis is, perhaps, a reactive rather than a bacterial inflammation. Prompt cessation of pain and tenderness follows the simple evacuation of the pus. There appears to be little or no tendency to bone necrosis; and chronic medullary abscess must not be confused with "ostitis interna" as described by Billroth or the "central necrosis" of Keen, although it may have the same origin. Nor, it seems, is there a tendency to perforation.

Brickner reports three interesting cases. In two there was a large chronic medullary abscess of the humerus. These were treated by simple evacuation through a small drill hole. In both, the pus was found sterile. The third case was of a small chronic medullary abscess of the femur, evacuated through an osteo-periosteal flap. All three cases were immediately relieved and returned to work, healed, in two weeks.

Chronic medullary abscesses are probably most often residual from an "osteomyelitis." Perhaps, however, they may develop sometimes from a pure infection of the bone marrow, either hematogenous or, as from a bullet or a surgical instrument, direct.

In spite of pre-conceived notions, evacuation of the chronic medullary abscess through a drill or trephine-hole in the bone seems to Brickner the method of choice. Admittedly such early healing as he secured may not always follow. As a result of secondary infection, or perhaps from the awakened activity of dormant organisms, continued suppuration or a localized bone necrosis may develop. But if these do not subside spontaneously they can be dealt with secondarily by an operation probably much less extensive than a primary exposure, by bone removal, of the entire pus cavity, sometimes a formidable operation that entails prolonged hospital care and loss of employment, and perhaps much permanent disability. Even in acute osteomyelitis it is not always necessary to remove bone over the entire length of the suppurating medulla; if it appears viable and sound, several inches of the shaft may be left undisturbed after evacuating its medullary pus with a spoon.

After trephining a chronic medullary abscess the cavity probably fills with granulation tissue. Such filling is apparently not necessary to the healing over of the soft parts, however. In selecting the spot for draining the bone, the point of maximum tenderness is the best guide. The roentgenogram is sometimes helpful in indicating a level where the medullary space would be found obliterated. The following technic is suggested, viz., to introduce nothing into the cavity except the single instrument by which it is opened; to insert a small gauze, rather than a tube, drain down to but not into the bone, with which to provide for the escape of any remaining pus, of blood and of serum; and to remove this—preferably without replacement—as soon as the discharge has practically ceased.

Dupuytren's Contraction of the Palmar Fascia. J. Hutchinson, London, *Lancet*, Febuary 24, 1917.

Hutchinson seems at last to have found the solution to the cure of this obstinate malady. The reason for the contraction is not the flexor tendon or intraarticular adhesions as formerly supposed.

The true reason is that, owing to the second phalanx being extremely flexed so that its base is pressed against the neck of the first phalanx, and, owing to this position being kept up during many months or years, the glenoid ligament in front of this joint, as well as the lateral ligaments, become shortened and incapable of extension.

The only way to overcome this obstacle is to excise the head of the first phalanx. Briefly the method is as follows:—

1. Through a palmar incision the bands of contracted and thickened fascia are dissected out, including their prolongations in front of the first phalanx. The palmar wound or wounds are closed with the finest black silkworm-gut. The finger still remains flexed at the first interphalangeal joint.
2. The hand is turned over so that the dorsal surface is uppermost, a semilunar incision is made over the first inter-phalangeal joint, the extensor tendon divided, the head of the first phalanx cleared to its neck, the latter cut across and the head dissected out.
3. The extensor tendon is slightly shortened and its two ends united, preferably with fine kangaroo tendon or Japanese silk, and the small dorsal incision (which is, of course, quite separate from the palmar one) is then sewn up. The finger should now become perfectly straight (or nearly so) *without any tension whatever.*
4. No splint is required in the after-treatment; the gauze dressing is a sufficient support. Gentle active and passive movements should be resorted to within the first few days. *No digit should be allowed to stiffen.*

Hutchinson reports results and shows photographs to prove his contention.

The Destruction of Angiomas and Other New Growths by the Injection of Quinine and Urea Hydrochloride. W. W. Babcock, Philadelphia, *New York Medical Journal*, March 3, 1917.

With a hypodermic syringe Babcock injects either a 33 or a 50% solution directly into the tumor, taking care that the infiltration is not too wide. A submucous or subcutaneous necrosis takes place resulting in scar formation and disappearance of the tumor. Babcock has used this method in a number of non-malignant conditions, e. g., angiomas warts, port-wine stains, urethral carbuncles, etc. He suggests the use of this method in many inoperable superficial cancers. The injection is followed by severe pain which, however, lasts but a short time and is followed by analgesia.

Nerve Grafting as a Means of Restoring Function in Limbs Paralyzed by Gunshot or Other Injuries. A. W. Mayo-Robson, *British Medical Journal*, Jan. 27, 1917.

Mayo-Robson reports two cases of nerve grafting between ends of divided nerves with complete restoration of function. In one case both median and ulnar nerves were united by inserting portions of the sciatic nerve and fraction of the spinal cord of the rabbit. Six years later the functional result was almost perfect. In the present war Mayo-Robson has been successful with this procedure in a large number of cases.

The Operative Treatment of Hydrocephalus: A preliminary report of 41 patients. William Sharpe, New York, *American Journal of Medical Sciences*, April, 1917.

Sharpe holds that, contrary to the prevalent belief, the majority of cases of hydrocephalus are of the external type and not of the internal. The youngest patient was 10 days old; the oldest 4. The younger the patient, the better will be the functional end results, because the effects of pressure upon the brain have not yet developed. The young patients also stand the operation better than the older ones. The operation consists in inserting six linen threads into the ventricle in the internal type and into the subarachnoidal and subdural spaces in the external type: the ends are brought out through the temporal muscle and fascia beneath the scalp in a stillate manner. Of the forty-one patients, thirteen died. In the remaining twenty-eight the results are "encouraging." All have been improved and are improving. The test evidence that improvement has resulted is shown in the fact that in all the changes in the optic disc have improved.

Intrathoracic Goiter. F. H. Lahey, Boston, *Boston Medical and Surgical Journal*, March 8, 1917.

Intrathoracic goiters are either adenomata or cysts originating in one of the lower poles or isthmus of the thyroid, and gradually enlarging downward into the thorax along the path of least resistance. The symptoms are: a feeling of pressure beneath the sternum, on swallowing, huskiness of the voice; dyspnoea, and intermittent attacks of suffocation. Intrathoracic goiter should be suspected in some cases of asthma. On physical examination, there is abnormal dulness over the upper portion of the sternum; *x*-ray reveals a tumor mass in this situation and there is inability to feel the lower pole of one of the lobes of the thyroid. The latter sign is especially valuable for diagnosis. The difficulty of removal of these goiters depends entirely upon how deep the mass is and whether the upper opening of the stomach is large enough for the tumor to be delivered. In many instances the opening must be enlarged by removing the upper portion of the sternum.

These tumors must always be removed en masse and not by morcellement.

Tubercular Cervical Adenitis in Children.

W. E. LADD, *Surgery, Gynecology and Obstetrics,* April, 1917.

During the past five years, Ladd operated on 159 cases of tuberculous cervical adenitis in children at the Children's Hospital of Boston and in his private practice. He was able to follow up 130 of these children for periods varying from six months to five years. He lost only one case, and that from meningeal complications. Ladd lays great stress on the importance of early operation when the glands are still discrete and when no abscess has as yet formed; also it is important to remove the portal of entry. This in his experience has been the tonsil chiefly. Infested teeth, adenoids, facial or nasal lupus may also be the primary focus of infection. In over 90 per cent. of his operatio cases he got primary union and in the same percentage out of a series of 119 cases there was no further evidence of tuberculosis at examinations made from one to five years after operation. He prefers the transverse incision in one of the natural folds of the neck. This gives the best cosmetic result. The type of infection appears to be from the bovine tubercle bacillus. Hence it would be desirable to secure milk from non-tubercular milk supplies. While other methods than the radical removal sometimes result in cure, they require a longer time and are less certain.

Tissue Tone as an Index of Vital Resistance.

H. R. HUGGINS, *American Journal of Obstetrics and Diseases of Women and Children,* April, 1917.

Huggins reviews several personal cases of fatalities following operation, particularly when the condition is one of prolapse of the uterus. These fatalities were due in his opinion to insufficient muscular cardiac "horse-power." He recommends that any attempt calculated to estimate the amount of stress a given patient will stand should be made before operation in elective cases. The resistance of the patient should be increased by prolonged rest in bed before operation, or any suitable measures which will insure against post-operative shock and asthenia. The electrocardiogram and frequent blood pressure tracings are here of greatest help.

The Simulation by Corpus Luteum and Retention Cysts of the Ovary of Ectopic Pregnancy and Early Uterine Abortion, a Clinical and Pathological Study.

I. C. RUBIN, *Surgery, Gynecology and Obstetrics,* April, 1917.

Delayed menstruation in married women, while not of uncommon occurrence, is usually regarded in relation to pregnancy. This is not always the case. Not infrequently physical examination reveals a uterus changed in consistence and even larger than the average non-pregnant uterus is, making the diagnosis of early pregnancy strongly presumptive. Occasionally also an extra-uterine mass may be palpated in addition to the enlarged uterus. In spite of all this the menstrual flow delayed several days to a few weeks may set in and differs apparently in no way from the usual menses for that particular individual. In a certain number of cases with this symptom-complex, there may in addition be the symptom of pain referred to one or the other side, dizziness or even faintness and severe abdominal cramps. In other words there may be present the essential points in the history and physical findings of the patient to lead to the diagnosis of an ectopic pregnancy. Occasionally, the cystic mass may be unmistakably ruptured during the physical examination, thus further simulating a ruptured ectopic gestation sac. Yet neither in the subsequent course, nor at laparotomy is an ectopic pregnancy proved. Instead a retention cyst of the ovary varying in size from a plum to a small orange is the only abnormal finding. This cyst may be a simple retention cyst histologically with or without lutein cells, or it may be a genuine corpus lutein cyst. These arise either as a result of early death of an intra or extra-uterine embryo, the subjective symptoms being wholly due to the gestation itself; or arising as a result of trauma or degenerative changes in the ovary, the corpus luteum cyst may induce secondary changes within the uterus, enlarging it, softening it, prolonging the decidual (pre-menstrual) phase, and inhibiting the onset of the menses.

From an analysis of the histologic findings in the cases personally encountered and operated upon, Rubin concludes that it appears that corpus luteum cysts and retention cysts of the ovary may simulate early terminated intra or extra-uterine pregnancy without either of these conditions actually having been present. On the other hand, it is more likely that in the majority of instances these retention cysts result secondarily through early embryonal death whether the impregnated ovum lodged within the uterus or within the tube. The ovum is in these instances disintegrated and absorbed and restitution (involution) takes place without the external or internal hemorrhage which we are accustomed to see in uterine or ectopic abortion. In all probability a great many nontragic ectopic pregnancies terminate in this way.

The Advantages of Conservative Surgery in Operations for Diverticula of the Descending and Pelvic Colon.

J. W. KEEFE, Providence, *Boston Medical and Surgical Journal,* Feb. 22, 1917.

1. Our knowledge of the origin of intestinal diverticula is meager, and but little unanimity of opinion exists relative to the etiological rôle played by the several factors mentioned as causes.

2. The symptoms are definite and characteristic, and failure to recognize the condition arises more from a lack of knowledge of it and a failure adequately to realize its importance, rather than from any inherent difficulty in the diagnosis.

3. Inasmuch as the location of the region involved and the period of life at which the condition occurs are identical with those of malignant growths, the differential diagnosis between these two conditions becomes difficult and is of paramount importance. Other conditions to be differentiated are: left-sided appendicitis, and tuberculous and luetic growths.

4. The *x*-ray examinations afford a most valuable aid in diagnosis and are of especial value in differentiating between diverticulitis and carcinoma.

5. As a result of infection through intestinal diverticula, grave, and not infrequently fatal, complications arise, namely:

(*a*) Chronic extramuscosal inflammation, frequently resulting in tumor formation and simulating carcinoma.
(*b*) Peritonitis resulting from the perforation of a diverticulum.
(*c*) Abscess formation.
(*d*) Intestinal obstruction, due to adhesions of the inflammatory mass to contiguous structures.
(*e*) Fistulae and fistulous tracts, particularly between intestine and urinary bladder.
(*f*) Chronic mesenteritis.
(*g*) Metastatic suppuration in the liver.
(*h*) Malignant changes resulting in carcinoma.

6. In deciding on the type of operation to be performed in a case of diverticulitis, the one fundamental principle which, to the exclusion of all others, should guide the surgeon, should be that of conservatism. With this serious surgical condition he should aim, not at completeness and a display of surgical technic, attempting to do a brilliant and radical operation with great hazard to the patient; but, rather, should strive to preserve life through the gravest part of the illness, employing such palliative procedures as draining an abscess, performing a colostomy, or adopting, in suitable cases, the two-stage operation.

Thousands of doctors in Europe, Canada and Australia have sacrificed their practices—many of them their lives—at the call of their country. YOUR country is calling now!

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CLINICAL OBSERVATIONS ON THE TREATMENT OF PROSTATIC OBSTRUCTION.*

HENRY G. BUGBEE, M. D., F. A. C. S.
NEW YORK CITY.

Probably in no other line of surgical procedure has such real progress been made during the past decade as in the treatment of prostatic obstruction.

It was to be expected that general surgical technic, which has led to the advancement in the surgical treatment of other regions of the body, when combined with our precise methods of study of the urinary tract, would bring about radical changes in local operative procedures. This has happened, and the results speak for themselves.

At all times and in all conditions where advancement has been rapid, the drift of thought is apt to be directed in a channel which tends to be become narrow, unless we occasionally stop to recapitulate.

It is my desire to do this briefly, and my plea is for the treatment of the "prostatic" as an individual, not as a class.

When we speak of prostatic obstruction we think of a man of middle life or advanced years who is presenting some difficulty of urination, due to a change in the consistency or conformation, or both, of the prostate gland.

The cases of prostatic obstruction in the young man are inflammatory, or due to congestion, and often associated with venereal disease. This type will be seen less often as the treatment of the primary disease is being carried out in a more and more intelligent and thorough manner.

We will say, then, that a prostatic is a man of middle life or advanced years. He has reached the point where certain physiological and pathological changes have taken and are taking place. The extent of these changes must vary with the individual. We must consider his heredity; his history to date, both physical and environmental; his present status of mind and body, and what his future has in store for him.

One individual shows little or no physical deterioration, but mental changes; another is at the height of mental development, at the expense of physical health; others are phlegmatic physically and mentally.

Few men reach middle life retaining physical vigor. With advancing years life becomes more confining, the body is called upon for more and more of its reserve, until this gives out and the capital is drawn upon, with tissue changes in direct proportion to the daily restoration possible, or the partial "come-back" of an occasional vacation.

The accompaniments of affluence,—a more sedentary life, more and more food and richer food, alcohol (temporary stimulation to drive on the tired individual), less sleep and greater mental requirements,—make a lack of resistance, in varying degrees, on the part of our private patients, while the hospital charity patient suffers from over-work, physical and mental (in proportion to his development), lack of nutrition, improper hygienic surroundings, and a routine existence. Thus we have to deal with an impaired organism as a whole.

The man of middle life is undergoing a sexual change. He is inclined to be less active sexually, and frequently to cut off intercourse, or to be too active from unnatural stimulation. Both lead to congestion. A large proportion of men have suffered from a prostatitis in early life, the accompaniment of a venereal infection, or a prolonged congestion due to irregular sexual habits, and the glandular tissue is more or less impaired.

Add to this the congestion caused by the sitting posture, increased by slight motion, as in automobile riding; poor circulation; local pressure on the prostate from fecal masses in the rectum; a stream of urine bathing the vesical and urethral surfaces of the prostate,—a urine irritating from its chemical constituents, often containing bacteria in large numbers, originating in a sluggish colon,—and I believe we have a real predisposition to growth-formation, whether adenoma, fibroma, or carcinoma.

I would not intimate that a growth in the prostate can be obviated by the regulation of the life of the individual, any more than fibroids may be obviated in the female. You will say that you have seen many cases in which the individuals have lived model lives. While this may be true in some cases, the most careful questioning will usually reveal some of the points mentioned. The prostate is only part of the human organism,—all parts must work in harmony, and the body must be considered as a whole.

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*Presented before the New York Urological Society, at its stated meeting, December 6, 1916.

Too often the busy urologist leaves the history taking to an unskilled assistant, with little knowledge of urology and none of human nature, who is neither competent nor tactful enough to obtain a history containing any more than a few facts relating to the urinary system. It may be impossible to obtain a history at one sitting—certain points will be revealed by the patient only after his confidence has been obtained.

Linked with such a history, one should obtain a complete analysis of the individual from a general physical examination. It is often unwise to make the complete examination the first time a patient is seen, and we all know how important it is to make repeated observations under changed conditions. How often the patient comes with the question on his lips: "Must I have an operation?" and, after meager questioning and a rectal examination of the prostate (often a congested prostate, perhaps with an overdistended bladder, pushing it down, peri-prostatic inflammation, and a rectum partly filled with fecal masses), a cystoscopic examination is made, and, with a few ounces of residual urine and a gland showing some intravesical protrusion, its removal at once is advised.

If this is done, how often is a nerve lesion overlooked, a congested prostate removed, a localized edema of the vesical neck mistaken for true prostatic obstruction? In the absence of a cystoscopic examination a stricture or vesical calculus may be mistaken for prostatic obstruction.

If the patient had been closely observed over a period of time, his general well-being considered, and repeated examinations made, would this have occurred?

Is it not justice to the patient to give him this chance, and, when he has acquired an even physical and mental keel, to pass unprejudiced judgment? I believe that very few patients will be unwilling to cooperate with us.

This may sound primitive, but the foregoing words are to my mind necessary. The poorly trained urologist does not consider his prostatic cases individually, as he is not personally equipped to do so. The expert urologist is often too busy to give sufficient time to an individual, and is only too ready to emply quick operative treatment, in which he is skilled, and in which his immediate mortality is small, without giving sufficient consideration to two points: (1) Is the operation of prostatectomy the best method of treatment of this individual case? (2) Will the end-result be the most advantageous to the patient?

It has been a revelation to me to observe, after instituting a regular mode of living, diet, and exercise, what improvement in the local prostatic condition has taken place, and how the patient who seemed a sure prostatectomy when first seen, has gone on in comfort in his new method of living; a minor operation substituted for a major; or has at a later time come to prostatectomy with a new reserve with which to meet the exigencies of the major procedure.

The foregoing applies more to those of sufficient intelligence and so situated that advice can be followed. The environment of the individual must be seriously considered. Often a prostatectomy must be advised through inability to satisfactorily carry out hygienic and local measures. A man must be restored to his greatest efficiency in the shortest possible time, and must take a greater chance in doing so.

Hospital ward cases must be considered differently from private cases, but here preliminary treatment can be instituted and carried out, greatly reducing the complications of prostatectomy. This treatment is often shortened by the desire to operate, on the part of the surgeon, or he is hurried into it by the house surgeon, the success of whose service, in his mind, depends upon the number of operations he performs or assists in.

I believe that private cases are best studied in their own environment, if this is possible—the environment in which they are to live. To place a patient in a hospital, instituting radical measures of diet, increased elimination, and local treatment, and then, on improvement, to turn him loose, to return to his old habits of life, will give no lasting benefit, and radical measures might as well be introduced at once, rather than later, when a more aggravated condition will be present.

If patients realize that they are to be treated in this manner, that they are to be observed by an unprejudiced surgeon, they will come more often for inspection, and such a relationship between the specialist and the patient, as well as with the general practitioner, will, I am sure, lessen the number of cases coming to radical surgical procedures. The predisposing factors to prostate changes will be diminished, the causes of continued irritation eliminated, and borderline cases which are progressing would be relieved by radical surgical procedure at a time when the operation will be attended by the lowest mortality and the most complete end-result.

The ideal treatment for true prostatic obstruction must be based primarily upon the pathology of the individual gland; secondarily, upon the pathology of the urinary tract of which it is a part;

and thirdly, the pathology of the entire organism of which the urinary tract is a part.

If these three elements were constant, the treatment for the relief of prostatic obstruction would be comparatively simple. While the pathological changes which take place in the prostate gland, leading to obstruction, follow certain types and many cases fall directly into one of these classes, others present variations which make them borderline cases.

While we know from experience what complications we are to expect from the secondary changes in the urinary tract and the end-function to be obtained, here again the individual pathology is the only key to the situation, and must be continually borne in mind.

The study of large numbers of cases has led to the laying down of certain indications for or against definite lines of treatment based upon the organism as a whole, but here again the individual must be considered from every standpoint.

The above renders the problem of the management of cases of prostatic obstruction secondary to none encountered in the human body, as regards fineness of judgment.

That some ground may be established for the building of general principles of treatment based on the pathology of the prostate, we speak of: (1) The fibrous prostate, in which there is a marked increase in fibrous tissue and a diminution of glandular tissue. Here the gland becomes hard, and usually diminished in size. (2) The adenomatous prostate, in which there is a glandular hyperplasia. This may be localized to one lobe of the prostate, or may involve the entire gland. (3) Malignant degeneration of the prostate. As I have said before, there may be a combination of types.

The *small fibrous prostate,* forming a hard ring about the vesical neck, causing a construction of the outlet, or interfering with the function of the internal vesical sphincter, is one of the most difficult types of obstruction to relieve.

Dilatation of the vesical neck gives but temporary relief. The operation for the removal of this type of prostate is unsatisfactory because of the difficulty in removing the gland, the damage to the vesical neck and sphincter in doing so, and the resultant cicatricial contraction.

For these reasons, various types of less radical operations have been devised, the object being to increase the size of the outlet and diminish the resistance of the hard ring. The most notable of these procedures are: A division of the ring and the removal of a U-shaped piece by means of an instrument introduced through the urethra (Mercier); the substitution of galvano-cautery for a cutting instrument (Bottini, later modified by Frendenberg and Young); the operation of Mercier applied through an external urethrotomy wound (Govley); galvano-cautery prostatotomy applied through an external urethrotomy wound (Chetwood); cautery applied through a cystoscope (Goldschmidt); a removal of pieces of prostatic tissue by means of a modification of Mercier's instrument (the Young punch); the destruction of tissue with the high frequency spark applied through the cystoscope (Bugbee).

The fact that there are so many methods of treatment indicates the inefficiency of all. I believe, however, that the success attendant upon the carrying out of any of these procedures bears a direct relationship to the dexterity of the surgeon and to his personal experience with that type of câses, and attention to details of the operation of which he is the originator or which he has employed the most often. I will not attempt to enumerate the apparent advantages and disadvantages of each.

The statistics given by Young are the best recorded in this class of cases, but are of too recent date to permit of judgment as to the permanence of cure.

Application of the high frequency spark must be made too often and too extensively to be satisfactory in the majority of this type of cases. The local reaction caused by the frequent applications often leads to irritability and infection.

A type of cases spoken of as median bar obstruction, in which there is an elevation only, of the vesical outlet (trigone), may be quite distinct from the small, fibrous prostate, and does not seem to fall into any of the three classes. This elevation of the trigone may be due to a hypertrophy of the mucous membrane only, to an infiltration of the trigone with fibrous tissue or an elevation from very early and limited adenomatous hyperplasia of the median prostatic lobe. This type of obstruction is relieved readily and permanently by burning a furrow through the obstructing tissue. Young claims the same result with his punch. The advantage of the high frequency spark is that one is working by sight, there is no hemorrhage, no resultant cicatricial contraction, and it may be repeated as often as is necessary.

These are cases that should be kept under observation, as the result of any line of treatment is apt to be less permanent.

Adenoma of the prostate comprises the vast majority of cases observed, and may involve any one of the prostatic lobes, any combination of lobes, or all, and the line of treatment to be instituted depends upon the type of obstruction present, taking into consideration the general condition of the patient.

In the majority of cases the earliest adenomatous hyperplasia takes place in the median lobe. This causes an elevation of the vesical outlet and trigone (more pronounced than the median bar), and in very early cases this condition may be found without change in any other part of the gland. What appears at first sight to be a prostate of considerable size, the seat of general adenoma, may prove to be a congested prostate which, when reduced by general constitutional and local treatment, shows only a small intravescal median lobe enlargement.

I have had excellent success in this type of cases —small median lobe enlargement only—by burning through this lobe with the high frequency spark, widening the furrow until it is of sufficient width to remain open when the patient strains, as in voiding. No more tissue is destroyed than is necessary to give immediate relief, and further applications are made at infrequent intervals if the routine examination, every six months, reveals any necessity for this. Some of these cases were treated nearly five years ago, and no cases of this class have since come to prostatectomy.

Most patients with this type of prostate have very few urinary symptons, and these symptons are so trivial that they are inclined to seek advice, perhaps in fear of an operation. Were they made to realize that any and all urinary disturbances are important, and when taken in time might be relieved by a palliative procedure, they would be more apt to consult the urologist.

Occasionally a small anterior lobe, which ordinarily disappears in fetal life, persists and becomes the seat of adenomatous enlargement. This may be found with a median lobe, and I believe this is important to recognize, as it may cause continued obstruction after the median lobe has been partially destroyed.

When this condition is present it may be best to use the Young punch, removing at the same time sections of the anterior as well as the median lobe. Whether the punch or the spark is used, every precaution should be observed, preliminary to, as well as at the time of, operation, to lessen the chance of infection.

I again emphasize the point that the success of the minor operative procedures depends upon attention to details, perfect technic, and after-care.

An inoperable case of general adenoma has recently been brought to my attention where the prostate, by the use of radium applied to the rectal and urethral surfaces of the gland, became reduced to a hard, fibrous ring about the vesical neck. The obstruction caused by the ring was relieved by multiple punches with the Young punch.

In all other forms of adenoma—lateral lobe enlargement or combined lateral and median—and this embraces a large proportion of cases seen—a prostatectomy is advisable, unless there be a contraindication, as follows: Some general nutritional disturbance; severe diabetes; extensive changes in the heart and in the kidneys; advanced arteriosclerosis; general chronic urosepsis. Of these conditions circulatory disturbances are the most important and most likely to lead to a severe complication at or following operation.

While any one of these conditions may be an immediate contraindication to operation, a regulation of the individual as before suggested may, at a later date, place the patient in the operative class.

Seldom is a prostatectomy an emergency operation—a cystotomy may often be such—but an emergency operation is an immediate expedient for the saving of life. Not only is a cystotomy an emergency operation, but it often one of choice. The relief of pressure on the prostate, resulting in the rapid diminution of congestion, relief of back pressure in the kidneys, the possibility of flushing the system, and the relief of urosepsis, make this preliminary procedure one of choice in a majority of the cases of prostatectomy. Often satisfactory results may be obtained by the use of an in-dwelling catheter, but here the drainage is less complete, and the catheter may cause irritation of the urethra, with a certain amount of septic absorption.

The preparation of the patient for operation may be summed up as follows: To simulate as closely as possible before operation the conditions we expect to obtain after operation, so that the process of transition is made with little or no shock to the system.

As to the type of operation to be employed in the removal of the prostate, I believe too much emphasis has been placed upon this point. One should be as familiar with the anatomy of the perineum as with that of the suprapubic region. The operation of perineal prostatectomy perfected by Young has many advantages if carried out as by him; if not performed in this manner, the suprapubic route should always be selected. Some cases fall at once into the suprapubic class. Rather than lay so much emphasis on the type of operation, let us use our energies in preparing our cases, and in postoperative attention to details.

I shall not take up here the technic of prostatectomy.

Is it fair to sentence our patients to sure death within so many months or years if they do not undergo a prostatectomy? How often do we hear the statement made that catheter life means one infection after another, with a fatal outcome in a very few years. Often this is true, but in dealing with a class of patients who can intelligently follow out our instructions, a catheter may often be used for many years with slight deleterious effects.

It has been a surprise to me to see how comfortable inoperable cases of general adenoma of the prostate have been made by partial relief of the obstruction by burning through the median lobe with the high frequency spark.

Of cases so treated in the past five years, only one has since come to prostatectomy, out of a group of many cases. In two the treatment was discontinued because of the impossibility of manipulation,—due to the size of the prostate. If the prostate is of such size that the passing of a cystoscope results in traumatism, no attempt to apply this treatment should be made.

All of these cases were placed on a regular routine of life, with the most minute attention to diet, exercise, and bowels. A furrow was cut through the median lobe, and widened from time to time. The case that came to operation was markedly improved over his former condition. A growth on the surface of this prostate had been removed by the high frequency spark, as well as a furrow made in the median lobe. Operation was advised because of continued enlargement of the lateral lobes, with increasing retention, and the marked improvement in the patient's general well-being. At operation all that remained of the median lobe was a band of fibrous tissue.

Another patient is comfortable on partial catheter life. Others, whose condition is so improved that operative risk is warranted, are so comfortable that they refuse radical removal of the prostate, preferring to come for inspection and occasional application of the spark when indicated.

This method of treating general adenomata is not the method of choice, but an attempt to make more comfortable those who cannot or will not have a prostatectomy. As I have said before, given an operative risk and a general enlargement, or even a partial involvement of the gland of any appreciable size, prostatectomy is indicated.

Other methods of treatment must be explained as palliative, requiring a long period of time, and possibly be followed by a radical operation, should the patient's condition warrant it at some future time. It must be carried out most carefully, or should not be undertaken.

Carcinoma of the prostate. One of the strongest arguments for the removal of an adenomatous prostate is that so many become malignant. This is certainly a serious consideration, and often warrants the taking of certain operative risks.

The diagnosis of carcinoma of the prostate is often difficult or impossible. The adenomatous prostate is frequently seen for the first time during an acute infection, when inflammatory reaction and infiltration are added to the glandular hyperplasia. This is difficult to differentiate from malignancy, differentiation being possible only after general and local measures have been adopted to reduce the inflammation. Carcinoma generally originates in the posterior lobe and is seldom detected by palpation while in the incipient stages.

When the diagnosis of carcinoma can be made, the growth has usually extended through the prostatic capsule, and for this reason the result of the removal of the prostate is seldom satisfactory. I have seen the most favorable operative cases, where the growth was not diagnosed until the removed gland was sectioned, followed by extensive recurrence within six months.

Symptoms are seldom present in carcinoma of the prostate until an infection has occurred, although the first symptoms may be due to pressure. The removal of this infection often gives complete relief for the time being, and continued care toward this end may result in comparative local comfort until metastasis takes place.

When obstruction occurs, making catheterization painful or impossible, either the obstructing portion must be removed or destroyed, or a suprapubic drainage must be made. During the past year and a half radium has been employed more and more, being applied to the vesical or rectal surfaces, or into the substance of the gland. My own experience has been too limited to draw any conclusions. Cases observed and treated by others have shown considerable toxemia following the applications, and the time is too short since the treatment to give conclusions.

It seems to me that sufficient radiation to cause a decided and permanent effect in reducing the size of the growth must cause extensive tissue destruction (very little of which is cast off on the surface), and this must be taken up by the system, with resultant toxemia. Does this hasten metastasis? And does not the lowering of the resistance from the reactionary period render the patient less able to withstand the original disease?

My own feeling is that the less the mechanical interference, the more slowly the malignant growth increases in size, and that if the tissue is to be destroyed, the destruction should take place no more rapidly than the body can take care of it without causing severe reaction, or we must be able to neutralize the toxemia.

One case of scirrhus carcinoma now under my care has gone three years since first seen. He then had an extensive carcinoma of the prostate, vesicles and base of bladder, with complete retention. Enough of the obstructing portion of the growth was destroyed to allow relief by voiding and the passage of a soft catheter once or twice a day to draw off the five or six ounces of residual, has kept the patient free from urinary discomfort. He returned to his occupation, and only in the past few months has he failed from metastatic growths.

Perhaps in carcinoma of the prostate more than in any other prostatic cases must the man be treated as an individual, and while our means at hand are most inefficient, still we should attempt to give relief of symptoms.

I should emphasize the following:

(1) Our aim in treating cases of prostatic obstruction is to preserve the life of the individual, and to restore function.

(2) The restoration of function should be brought about as rapidly as is consistent with the individual after taking into consideration every point connected with his welfare.

(3) Prostatic obstruction of the vesical neck is mechanical and can be relieved only by removing the obstruction.

(4) The complete removal of the obstructing gland is the ideal method. Other methods of treatment must be considered as palliative, may result in cure or be followed by radical operation.

(5) When the ideal cannot be attained, much relief can be given by painstaking treatment and complete cooperation between patient and surgeon.

Before performing prostatectomy, it is desirable to determine roentgenographically that there is no stone in kidney or ureter.

Have you asked yourself whether YOU ought to join the Army or Navy Medical Reserve Corps?

Tell the young hospital graduate who fears that if he enters the Medical Reserve Corps he may be killed by submarine or bullet that better men have died for less.

BONE GRAFTING.*

V. A. Funk, M. D.
Vincennes, Ind.

The experimental stage of the grafting of bone has been past. Its clinical uses have firmly rooted the procedure in surgical practice. As abdominal surgery alleviated many racking pains, and prolonged numerous human lives, bone transplantation has restored thousands of invalids, relieved countless cripples, and made it possible for many to earn a livelihood who otherwise would have been partially or totally dependent. It has greatly shortened the treatment of disagreeable bone lesions, has obliterated various complications, and has made the once seemingly impossible, possible. It has almost revolutionized bone surgery. All surgeons acknowledge its advantages; none now doubts its adaptability; and the marvelous results obtained by all who are close adherents of truly aseptic surgical technic, are causing autogenous bone grating to be used more and more for the repair of conditions which a few years ago were handled by non-absorbable material.

The general practitioner should be familiar with the great possibilities of bone grafting. He should know thoroughly its indications, for he then perhaps would be able to direct some unnecessarily crippled individual to correct treatment, or by intelligent advice prevent him from becoming a distorted piece of humanity, burdensome to himself and to everyone around him.

The indications for the transplantation of bone have gradually increased since the beginning of this chapter of surgery. They at first were very few, but now they cover rather a wide field. When Lane first introduced the famous plate for fractures of recent date, or those which refused to unite, we felt that he had originated a great aid to our fracture surgery; but we realize now that in these cases a bone transplantation of some variety is far superior to the non-absorbable steel plate.

In fractures where the head of the femur or humerus has been broken off, they themselves, even though dead, act as a scaffold for the haversian vessels and perform the rôle of a transplant. Should it be an old fracture and the head of the bone is absorbed, a transplant can be placed with one end in contact with the shaft of the bone, the other in the joint cavity, and a new head will be formed. In ununited fractures, the transplant has proven to be the surest way to get union, providing the graft is long enough to span the eburnated portion which has been formed at the broken ends of the bone by nature's attempt to heal the fracture. Here the bone graft has been used with most excellent results. I think that we can safely say that the non-absorbable material which has heretofore been used in the repair of bony defects, is as sure to disappear from bone surgery, as it has from abdominal surgery. Albee says he has not used metals in bone fixation for the last two years.

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* Read before the Wabash Aesculapian Society, Terre Haute, Ind., May 25, 1916.

In these large spindle-celled or giant-celled sarcomata and other lesions which, before the transplantation of bone was known, always called for an amputation, we are safe now to excise the pathological condition and fill in that defect with bone, thereby giving the patient a perfect limb, and as useful as he had before the trouble began. Bloodgood reports twenty-three cases of bone transplantation in giant-celled sarcoma with no recurrence. Some of these cases had been curetted one to two times with recurrence each time. In chondrosarcoma the chances are better for amputation, yet about fifty per cent. of the patients will not have a recurrence after resection and transplantation; therefore, the transplant is always worth a trial.

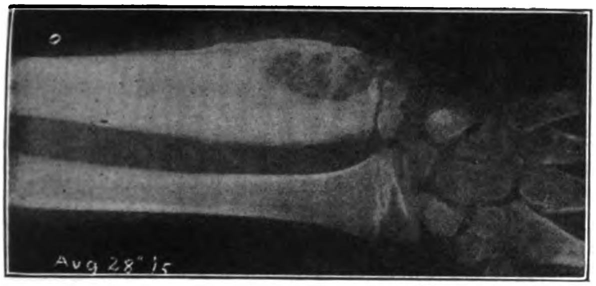

Fig. 1.

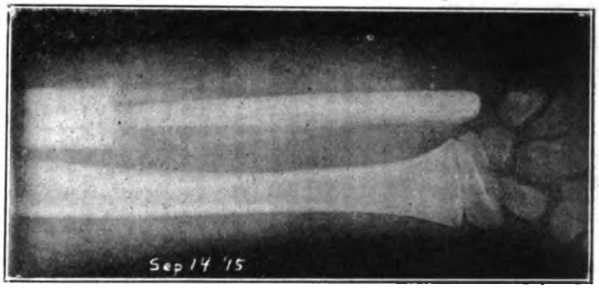

Fig 2.

One of the greatest uses for the bone graft is for Pott's disease of the spine. Albee reports 104 cases operated upon, in every case of which that had paraplegia the paralysis cleared up, the time varying from three to five months. The law governing this procedure is, as we know, to immobilize, support and separate the infected vertebral bodies. This is to prevent them from being crushed after they are softened by the infective process; otherwise, the disease will extend from one to the other. The main object is to splint the diseased area, just as it is with the plaster jacket and spinal braces; but, in bone transplanting the deformity can always be straightened more or less, according to the duration of the disease. We also put the infected part absolutely at rest, which is of paramount importance in all tuberculous infections, no matter in what part of the body. There is a dispute among some of the writers as to the age of the patient at which bone transplantation for Pott's disease of the spine is eligible. Young says not to transplant in patients under eight years old.

One of the inspiring things about bone grafting is its possibilities, which are by no means exhausted. The peculiar thing about a transplant in tuberculous lesions is that the graft will span through pure tuberculous infection, where no mixed infection is present, if in contact with the healthy bone on either side. In the pitiful osteomyelitis cases, once the dread of every surgeon, where from the loss of bone, extreme shortening, total disability or perhaps amputation as the last resort, was the patient's fate, we can now obtain thorough drainage, convert the infective process into sterile field and then by the transplantation of bone, change a hopeless case into a happy and useful patient. Defects of the bony framework from gun-shot wounds or injuries of any kind, can, after the field is freed of infection, be converted, made normal or almost so, by bone grafting.

Bone grafting of cranial defects is rather new, yet portions of flat bones are used successfully and quite large defects can be filled in. The best bones for this work are pieces from the ribs because of their shape and from the fact that they can be bent to coincide with the curvature of the skull. Congenital defects of the bony skeleton may also be eliminated by transplantation of bone. Troutt of Virginia recently grafted a piece tibia from the patient's father into a spina bifida defect with good results. Rogers grafts bone on the front of the fractured patella to bridge over the line with new bone instead of uniting the capsules or wiring the bone, which often gives only fibrous union. In some of his cases he has grafted after refracture and in some after the wiring operation had failed.

What kind of a transplant should we use? This question has caused various experimental work. Some of all the various kinds of transplants have given good results. The best and the surest results have come from the autogenous grafts, or those removed from the same body, and with its periosteum. Quetner transplanted the hip joint and the upper third of the femur from a cadaver with good results. The bone was stored for twenty-four hours in saline solution to which some chloroform had been added; but most of the experimental work in transplants from animals or other persons have not given the brilliant results that the autogenous transplants have. Man to man transplantation is dangerous from the standpoint of introducing infection by tuberculosis or lues. There seems to be also in this form of grafting a tendency to a malignant non-bacterial suppuration, so severe at times that it may cause gangrene.

Although bone transplantation has become a well recognized and successful procedure, perhaps no one subject in surgery has created a greater discussion than that of the function of the periosteum in the bone grafts, and the rôle played by the graft itself. In Germany the view is generally accepted that the bone graft always dies; that it is totally absorbed and is reformed from the periosteum, which alone remains living in the transplant.

Macewen claims that the bone in the craft is reproduced from the proliferation of the osteoblasts, derived from the osteoblasts within the bone of the graft itself, and the regeneration takes place independently of the periosteum, the latter acting as a limiting membrane which prevents the spread of the osteoblasts into the surrounding tissues.

Murphy claimed that the graft is purely an osteoconductive agent only, forming a scaffold or framework upon which the haversian vessels and osteoblastic cells may travel. The haversian canals of the dead bone act as tubes into which the haversian vessels from the living bone pass. These vessels carry with them on their walls osteoblasts and osteoclasts. The osteoclasts dissolve the dead bone that was transplanted and the osteoblasts follow, building up the new, the transplant thus acting in an indirect manner entirely. It is hard to arrive at a conclusion as to the rôle the transplant plays in this procedure as the ideas of different observers vary so greatly. Although Barth at one time held the view that a transplant or fragment of bone acted merely as a scaffold for the developing osteoblasts, he now accepts the view of many others that the compact bone of the graft is absorbed and that it is replaced by bone formed by the periosteum and the endosteum of the graft.

I think that the greater number of surgeons of to-day incline to accept the views of Barth in the reproduction of the bone and the function of the graft, and therefore adhere to the rule of always retaining the periosteum, and if possible some endosteum, with all grafts. However, some are convinced by their own experiments that the graft does not need intact periosteum, and according to Murphy's theory there would be no use of including the periosteum with the graft, as the results would be as constantly perfect with the scaffold being made up with nothing but bone as they would have if the periosteum had been retained. There is not, however, a single instance where he ventured a transplantation without retaining the periosteum. He made the excuse that his results had been 100% good with the periosteum retained, so why run a risk by leaving it off. He could hardly advance a theory on very permanent grounds until he had proven it by experimental or clinical observation. However, from a standpoint of success it matters not to us what function the transplant plays, and that portion of the subject is interesting only from a scientific view, yet, as in all surgical procedures, when the whole process is thoroughly understood there are usually radical changes in the procedure for the betterment of the patient concerned. When we consider the amount of discussion that has arisen over these two points, we feel that it has been hair-splitting. When the function of the graft and also that of the periosteum have been proven beyond a doubt, we may gain nothing by the knowledge, from a clinical standpoint. However, certain laws or rules are already permanently established by which we must regulate the practice of

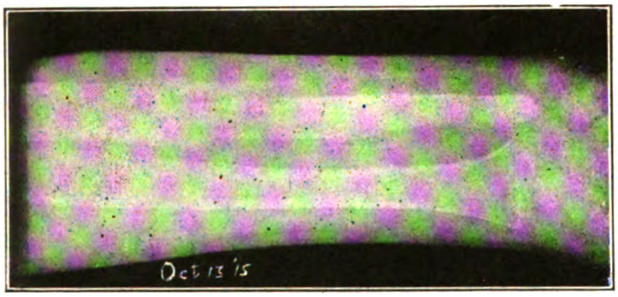

Fig. 3.

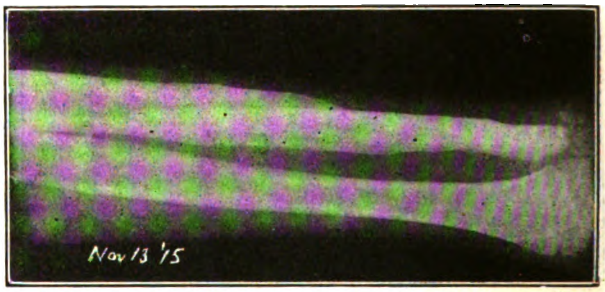

Fig. 4.

bone transplanting which, if overlooked, are sure to make sad failures of the procedures.

Lexner claims that failure may occur after the initial healing, because of absorption taking place faster than the process of healing. If the graft is not long enough the results are sure to be disastrous. We must not fail to have the graft long enough to extend a good distance into each marrow cavity in order that there is no liability of its working down or up, thereby breaking the bridge which has been formed between the two ends of the normal bone. An absorbable peg may be inserted to retain the graft in place. When the bone is used as a peg in fractures of the neck of the femur and humerus to hold the head in position, it must fit snugly enough in the hole prepared for the peg so that it will not easily work out. We cannot expect a small piece of bone to act as a splint therefore, the part must be immobilized after bone transplantation as though we were treating a simple fracture without any internal coaptating material whatever. If we do not do this, our graft is sure to be a failure. If the graft becomes loose, or a septic condition arises at the site of the graft, it will develop into a sequestrum and will have to come out. There is a possibility that we may get union around the loose graft or around a graft which has become infected, after the infection has subsided, but a dead infected transplant will usually become a sequestrum and will act as such. The graft must be in contact at one or both ends with living osteogenetic elements. This must always be carefully considered when dealing with ununited fractures. When the graft is in contact with living bones at both ends the defect will be filled in, and the repair will take place, more rapidly than where the graft is in contact only at one end.

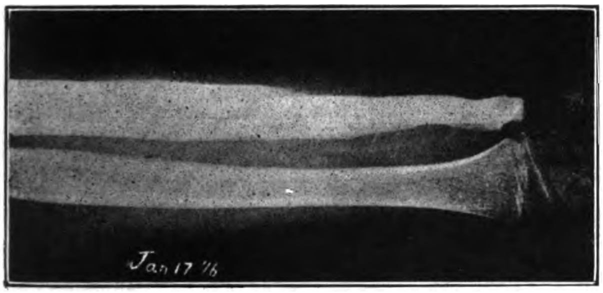

Fig. 5.

If we are transplanting for congenital defects, or for defects from injuries to a bone which is covered with periosteum, we must always freshen the bones where the transplant comes in contact, by raising up a periosteal flap, otherwise the transplant in time will be absorbed whether it is planted with or without its periosteum. This, however, has been doubted by some observers, and some have proven by experiments that bone with periosteum in contact will grow out in the tissues, with no connection whatever to any bone. However, I have failed to find any of these latter experiments extending over a very long period. The bone may survive without osteogenetic bony relations for a time, but I do not believe that it will remain indefinitely.

A transplant cannot be placed in the presence of pus, although this has been denied, and three or four cases are reported where good results were obtained when the transplantation was made to prevent defects while the infection was being treated. As a general rule, however, the results have been disastrous following this kind of work. There is a possibility in the cases that have been reported, that the infection had been going for so long that its virulence had become so much lowered that it was not able to cause the death of the transplant. We can also conceive of the surrounding tissues having coped with the infection for so long, that their resistance may have been brought to the point of withstanding an attenuated infection. Murphy reports an interesting case of a girl eight years old with osteomyelitis of the tibia where, to prevent shortening of the leg during the pus period, he transplanted bone in the osteomyelitic defect comprising almost the entire tibia, and the results were perfect.

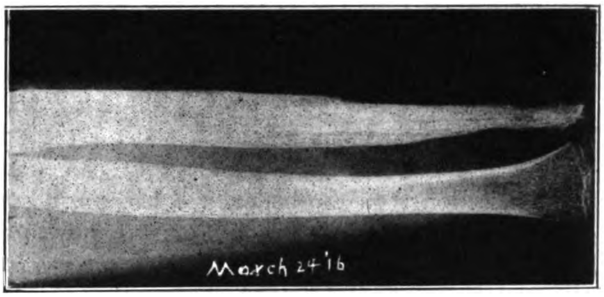

Fig 6.

Macewen claims the periosteum aids in the nutrition of bone because of its abundant blood supply, which is distributed through the haversian canals to the bone. The periosteum seems also to be a limiting membrane. Cohen claims that it has no osteogenetic function, because of the fact that the entire periosteum may be removed from growing bones, and their growth unimpaired, therefore, it is not essential for bone growth. We must consider, however, the endosteum keeping up the growth in a compensating way. As Albee says, there is much discussion as to the exact rôle which the autogenous graft plays, but as no one has questioned its reliability as a surgical agent, the discussion is really an academic one. Lexer claims that the bone marrow should be removed from all transplants, as he has had some unpleasant experiences in some cases where it was included. Marked inflammatory symptoms appeared, associated with mild fever developed about the transplant. It did not, however, prevent the proper healing of the graft, and he believed the reaction to be due to the absorption of the product of decomposition of the marrow. These grafts, however, were taken from amputated legs. The use of these homoplastic grafts may have been the cause of the disturbance. The men who are close adherents of the autogenous grafts have not reported any untoward symptoms from the retention of the bone marrow.

Bone transplantation must be done on definite principles, and these definite principles are: First, that the transplant should be taken with periosteum; Second, it should preferably be from the patient himself. If that is not possible, the graft should be taken from some one of about the same age, and a relative if possible. Third, it must be planted in contact at one or both ends with living bone denuded of periosteum. Fourth, strict asepsis is most essential. The peritoneal cavity can stand more infection than the bones, and because a surgeon can enter the abdomen and come out without leaving infection that will give trouble afterwards, is not a guarantee that he can perform bone grafting successfully.

The technic for bone grafting is rather tedious and generally difficult. The field is first prepared for the transplant, whether it is an excision of a certain portion of a long bone, the repair of a defect in a skull, the freshening and reaming out of the medullary cavity for non-union of a fracture, ~~or for~~ any transplanting procedure. This is prepared first, that the oozing which is always present from the tissues, may have a chance to subside while the graft is being prepared. The oozing, if not stopped before the graft is inserted, will cause the formation of a blood clot around it, preventing the direct adherence of the surrounding tissues to the periosteum, thereby blocking the much-needed nutritional transference from the vascular tissues to the periosteum. The graft is usually taken from the tibia, the skin incision made to one side of the tibial crest, that the scar may not be directly over the crest of the bone where it has little protection. The size of the graft is ascertained, it is removed and is then shaped to fill in the defect. Some surgeons are using an inlay from the same bone for ununited fractures. I like this method very much for those cases because it does away with the operative procedures on the tibia and causes only one incision to be made, and with the motor saw it is very quickly performed.

In a bone like the tibia or femur the inlay is easily prepared and the patient will submit to this when he may not submit to removing the bone from other portions of the body. Some modification of the inlay method can be used in all work on the long bones. The inlay is prepared by removing a piece of bone from the long fragment and a shorter piece the same width from the shorter fragment. The long piece of bone is then inserted to extend from one fragment to the other, filling in the defect which has been made from removing the shorter inlay. This leaves a gap in the longer fragment of bone in which the shorter piece can be dropped, which totally fills up the space from which the inlays were removed. The adherents of the inlay method for ununited or recent fractures, claim that it is superior to the intramedullary graft because it dispenses with the foreign body in the medullary cavity, and places the four osteal layers—that the periosteum, compacta, endosteum and marrow in direct apposition. These can be fastened in place by some absorbable material. A loop of silver wire surrounding the whole bone may be used, but absorbable material is much better. The bone graft may be removed by mallet and chisel, and the results from the operative procedure carried out under aseptic conditions will be as good, as if done with the more expensive motor saws. However, the removal of a bone transplant with the chisel very much prolongs the operation, and risks the chance of ruining the graft, which would necessitate a large piece of bone to be removed for another graft, thereby lengthening the time before the patient can use the graft-sacrificing leg.

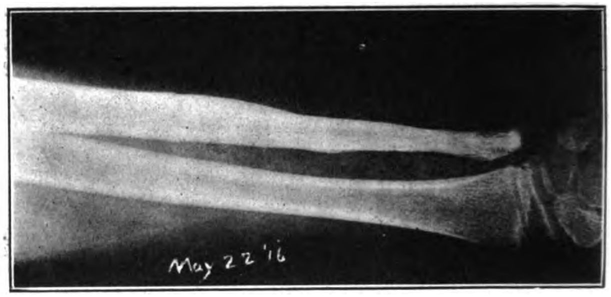

Fig. 7.

In transplanting for defects in the skull, the rib is the best bone to use, and the periosteum left on the rib and turned in makes an admirable surface for contact with the meninges. The inner periosteum limits the deposit of new bone toward the brain. Where it is not possible to inlay a graft, and the medullary canal is so small that a graft cannot be inserted within it, the fracture may be repaired by the periosteum on one side being removed for a distance, and a small graft strapped to the side of the bone, and the results will be favorable.

Henderson claims that while strict asepsis is very desirable, yet it is not absolutely necessary, for good results have been attained in spite of infection. Fixation must be retained for a long time as he has had two failures in fractures of the neck of the femur in which he used spike grafts, without immobilizing long enough. McWilliams is a very firm believer in the retention of the periosteum at all times. The growth depends on an effectual blood supply, and the periosteum favorably influences that supply. In his experiences, 100% of the grafts lived where the periosteum was retained, while in those grafts that did not have the periosteum only 40% gave good results. As we do not know what cases are going to have adequate blood supply and what cases are not, we had better take the benefit of the doubt and leave the periosteum in place. The periosteum lives from the blood supply of the surrounding tissues, the inner surface forming osteoblasts which take the place of the osteoblasts in the bone, if the latter die from the lack of blood supply. This is the case in grafts of large size. In transplanting a very minute graft, especially in tissues of abundant blood supply the results might be favorable, even should the periosteum be left off, because the graft being small, the whole bone can get direct nourishment from the surrounding vascular tissues. In defects of the lower jaw, any portion of the jaw bone may be removed and the defect filled in by a correctly shaped transplant. This is another place where the rib forms an admirable graft. A straight transplant from the tibia with cross saw cuts on the marrow side almost to the periosteal surface can also be bent to conform with the shape of the jaw.

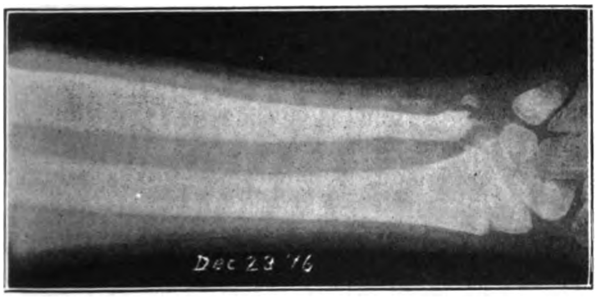

Fig. 8.

There is quite a discussion at present as to the technic in operating for giant-celled sarcomas. Some claim that at first they should be curetted, and if they recur, curetting a second time, is permissible, and should they recur again, then a resection of bone with transplantation is advisable. Others say curette unless the shell around the growth is not thick enough to get beyond the disease. If we can get perfect results in resecting to good bone on each side of the sarcomatous growths, why run the risk of the recurrence after curetting?

In fractures of the head of the humerus or femur a bone peg to hold the head in place is sufficient. The head must not be removed even though we think it is dead, because if it is held in place it will act the same as a transplant and the results will be perfect. The idea that one must use a graft of a size to correspond to that of the bone to which it is to be transplanted is erroneous. The graft does not have to be large in any case whatever. A small graft can be used in any locality, and its growth will proceed until it is large enough to withstand the strain to which that portion of the bone is subjected.

As to the technic for grafting in Pott's disease, the simplest and the one which is giving the best results is the splitting of the spinous processes of the diseased vertebrae, and of two or three vertebrae on each side of the diseased process, and into that split to insert a transplant to be held by absorbable sutures. The patient is then put in a plaster jacket and cared for the same as for non-operated Pott's disease.

T. P., Male, aged 11, entered the Good Samaritan Hospital, Vincennes, Ind., August 24, 1915. About one year before he began to complain of pain at the lower end of the ulna of the left forearm. There was no noticeable swelling until about four months later. The mother thought the enlargement which had slowly increased since first noticed, became larger at times and then decreased somewhat in size. The pain was preceded a short time by an injury at the region of the tumor by striking the arm upon falling to the ground from a low limb of a tree. The pain had never been severe, nor had it radiated. There had been no chills, but possibly some fever at time. The patients general condition was good.

There was enlargement of the lower end of the ulna, with slight tenderness. All the movements of the wrist were perfect except rotation which was limited. X-ray examination showed a cystic tumor of the lower end of the ulna.

At operation, the thin shell surrounding the cyst could be broken down with the finger, which completely destroyed all hopes of any procedure short of a complete resection of the bone above the pathological condition. The lower half of the bone, therefore, was removed and a transplant taken from the left tibis was placed in position. The soft tissues were sutured in place about the graft, and the wound was closed without drainage. A plaster cast was applied. The wound healed by first intention.

This patient has not worn a splint or any protection of the arm for the last six months. He is going to school and engaging in all of the sports that the other children do with no inconvenience whatever.

The pathological report of the removed tumor by Dr. B. C. R. Williams of Paris, Illinois, was as follows: Caries; rarefying osteitis; resorption and necrosis of bone; proliferating periosteum, showing both areas of injection and tubercles.

The accompanying plates show the pathological condition, the transplant in place, and the development of the bone. From No. 2 a plate was taken one month a part and gives a perfect picture of the steady filling in of the new bone. I wish to thank Dr. J. N. McCoy for his aid and interest in the case, in taking this series of pictures.

INTERNAL SECRETIONS IN OBSTETRICS AND GYNECOLOGY.*

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The glands of which I shall speak are the three that are intimately associated with the development of the genital organs and with their trophic care.

The first that occurs to mind is naturally the *ovary*. It is characteristic of the female, produces the ovum and exerts a direct trophic influence on the development of many of the female sex characteristics and in the development of the uterus and the internal and external genitalia.

Long before menstruation begins, the ovary, probably modified by the action of other glands, has created a differently shaped pelvis in the female than in the male. Through its action, probably modified by the activity of other glands, it has resulted in the development of the breasts, has modified the shape of the body, has not altered the character of the voice and has brought the uterus to a state of normal development. The first evidence of its specific activity is established by the process known as menstruation. Before this it is probably producing ova capable of fecundation.

Menstruation is simply an evidence, usually, that pregnancy is not in being. The secretion from the ovary thrown into the body through lymph- or blood-channels acts on the various membranes of the body, but specifically on the lining of the uterus. The so-called premenstrual congestion is evidenced in the nose, in the mouth, the larynx, the gastric musoca, the intestinal mucosa and in various nerve centers. The phenomena preceding menstruation are an evidence of the reaction of the system to the hyperemic and congestive influence of the ovarian secretion modified by the interactivity of other gland secretions. The lining of the uterus becomes swollen, hyperemic and thickened before menstruation, in preparation for the nesting of the fecundated ovum. If this does not take place then the hyperemia of the thickened lining is relieved by an outflow of blood from the capillaries and menstruation takes place. This is a loss of blood, but not a loss of actual tissue. It is as if water were pressed out of a sponge and in a few days the mucous membrane returns to its normal character.

If the ovaries fail to exert their proper function at the age of adolescence, either through actual injury or from mal-development, or through the inhibiting influence of other secretions, menstruation is delayed and many changes occur in the development of the female body.

Early functioning on the part of the ovary from the standpoint of internal secretory activity is not infrequently evidenced by short limbs and a lack of large development of the body, inhibition of the hypophysis or other glands probably being concerned in these phenomena.

The next gland of importance to the female is the *thyroid*. It is not sufficiently recognized that the thyroid is very intimately related to the sexual apparatus and is what might be called a sex gland. Its functions are more important in the female than in the male and diseases of the thyroid gland are more frequent than those in the male in the proportion of eight or ten to one. The thyroid has much to do with the development of the body, the development of bony growth and the ready action of the cerebrum. It has much to do with the action of the sexual apparatus and is probably concerned with the process of menstruation.

Thyroid diseases, whether those in which the secretion is increased or those in which it is diminished, are frequently associated with anomalies of menstruation. As a general rule in thyroid disease menstruation is diminished, but in some cases, strange to say, menstruation is increased. These apparently contradictory facts may be explained by the relation of the thyroid gland to the other secretory glands and by the fact that the individual cells and the vegetative nervous system do not react in the same manner in every person to the stimulation or absence of certain secretory substances.

The *hypophysis* is a gland of extreme nutritional importance in the development and maintenance of the genital apparatus. The hypophysis is also concerned with the bony growth of the body, overstimulation resulting in large stature; understimulation resulting in small stature sometimes to the degree of dwarfs. It is a strange fact that when we have any involvement of the hypophysis from the secretory side, an oversecretion or an undersecretion, it acts injuriously on the uterus and ovary. The function of the ovarian secretion is inhibited and the trophic influence of ovarian secretion on the uterus and other genital structures is held in abeyance, especially by hypofunction of the posterior lobe.

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* Read before the Associated Physicians of Montclair, N. J., January 22, 1917.

The posterior lobe of the hypophysis secretes a substance to which we give the name pituitrin, which seems to exert a specific influence during the period of labor. There can scarcely be an involvment of any one of these three glands without there being an associated upset in the function of the other two. Hence the result is a frequent distortion of symptoms depending on the manner and degree in which the secretion of the three and their relation to each other is altered.

The thymus gland has much to do with the development of the individual. In the early years it seems to exert an inhibitory influence on the ovarian function. Thymus extract should be given for persistent menorrhagia or metrorrhagia which yield to no other drugs which have been administered, especially in young girls.

The pineal, a gland rarely involved, appears to be intimately connected in an inhibitory way with the sexual sphere. Hence, certain affections of it result in sexual precocity more especially in boys than in girls. The adrenals have an action too, possibly not so marked on the genital sphere as such, but more or less associated with the other elements known under the name of Secondary Sexual Characteristics. They have a nutritional relation to the sexual organs.

Inasmuch as the secretion of the ovary is the active factor in producing menstruation, it is natural to expect that an extract of the ovaries would produce menstruation if trophic influence or a stimulation is all that is needed. This is a fact. Ovarian extract or corpus luteum gr. x, given three times a day, has a pronounced action in increasing the menstrual flow and bringing it back when absent for various reasons, and in aiding the development of the uterus if given early enough.

In young girls in whom chlorosis may or may not be present, this secretory substance, especially when united with iron, leads to the development of menstruation when late, and increases it when scanty. In lactation atrophy, this combination if given for a particularly long time, brings about a return of menstruation.

Amenorrhea, relative or not, may occur for various reasons other than the presence of pregnancy. In these cases too, which may last either a short or a long time, this combination is of remarkable benefit. Ovarian extract aids in clearing up a diagnosis. It brings about a return of menstruation when there is no pregnancy, and has almost no effect when pregnancy exists.

Dysmenorrhea is a condition in which ovarian extract is not infrequently of value. It by no means cures all cases nor a large proportion of them. To be of any value ovarian extract must be given in large doses for a long period of time. In fact this much must be said of ovarian extract or ovarin, that we expect too much of it in a short time. Its real value is only in evidence after it has been given for weeks and in some cases for months. This holds especially true of dysmenorrhoea; but in the large majority of cases its influence is nil. Dysmenorrhea is often due to a hyperfunction of the posterior pituitary lobe. Perhaps placental extract might be effectual in such cases.

Alterations of the skin of the face, particularly about the chin, not infrequently occur in young girls and young women. These changes are most evident before menstruation. While ovarian extract is no cure-all for these cases, it certainly is an aid, because we know that some anomaly of the secretory function associated with and related to menstruation is at the bottom of the condition. Here, too, ovarian extract may be given, the only contraindication being excessive menstruation.

Going from the period of menstruation to the period known as the menopause or climacterium, the natural trend of logic would lead us to believe that if in the menopause or climacteric period, there is a cessation of ovarian activity, and if various annoyances develop at this time, that the substitution of this lack by the artificial administration of ovarian extract, would bring about a benefit. This is true, much more true than is generally accepted. Practically all the annoyances associated with the climacterium, with the possible exception of menorrhagia, are very greatly benefited by the administration of ovarian extract. This does not imply that one should not also give the bromides or the hypophosphites or other drugs indicated. We simply substitute by ovarian extract the lack of this secretion in the body.

The climacterium is a period when hyperthyroidism or very often, hypothyroidism, is present. Sometimes these states alternate and thyroid gland is of immense value in the hypothyroid myxomatous cases associated with slow pulse, depression and melancholic psychic manifestations. In the climacteric period these annoyances may be present without cessation of menstruation The whole cycle of endocrine glands may be upset and in addition to ovarin and thyroid, hypophysis extract, suprarenal extract, trypsogen, etc., may be indicated, while in other instances these drugs, especially suprarenal extract, may be contra-indicated.

The trophic action of ovarian secretion on the external genitalia at this period is well evidenced by its therapeutic value in certain forms of senile vaginitis and in certain forms of vulvitis associated with intractable itching and not due to diabetes, and in those forms of vulvitis in which the skin particularly and the mucous membrane undergo structural alterations. The skin becomes thickened, it is slightly red, later it becomes white, looking almost like leucoplakia. Severer grades approaching the type of kraurosis vulvae also occur. These trophic alterations occur as a rule in women who have not menstruated for some time. The vaginal mucosa becomes thin, it is readily eroded, not infrequently it bleeds. Ulcerations form and adhesions between the anterior and posterior wall may occur. There are certain forms of puritus vulvae without evident alterations except that produced by scratching. In these cases whatever other line of treatment is followed, ovarian extract in large doses must be given for a fixed period of time.

Local treatment is advisable in these cases, the best drug being nitrate of silver. However, valuable and permanent results are obtained in the cases of vulvitis and in some of the cases of vaginitis by the administration only of ovarian extract in large doses for a long period of time.

We must bear in mind, however, that during this period of climacterium there is an alteration in the interrelation of the three glands mentioned. This alteration is essentially noticeable between the ovarian secretion and the thyroid. If the ovary and thyroid diminish in equal ratio, there is no relative increase in the thyroid. But if the ovarian function ceases more rapidly than the thyroid or if for any reason the thyroid does not retrogress, we then have a state of hyperthyroidism.

On the other hand, the thyroid may retrogress more rapidly than the ovarian or the thyroid may for one reason or other retrogress decidedly, and we have the opposite condition, the condition of myxedema.

Either of these states whether actual or relative is associated with marked upset in the nervous system. These alterations are apart from the flushes or flashes which are considered typical of the climacterium.

For the flushes or flashes, ovarian extract in large doses continued for a long time is of immense value. This holds true in the artificial menopause induced by removal of the ovaries or by atrophy of the ovaries after the removal of the uterus. The fault lies in not giving the drug early enough. If one waits until the flushes or flashes are fully developed, the possibility of overcoming them is not so good; in many cases very remote. But if on the first onset of these annoyances ovarian extract be given continuously, I know no drug which brings about a more specific result and greater improvement in the patient's annoyances than ovarian extract.

Referring now to the nervous phenomena associated with the climacterium I hold that the vast majority of these cases come under the heading of hyperthyroidism or hypothyroidism, and in many cases an alternation between these two extremes. The hypothyroid cases must be treated by thyroid extract with or without ovarian extract; the hyperthyroid condition must be treated with ovarian extract alone or associated with bromides and other drugs.

There seems to be a certain antagonism between the thyroid and the ovary. The glands antagonize each other and at the same time stimulate each other. Hence there is reason for giving ovarin in many cases of hyperthyroidism, especially where this condition is a relative one due to diminution of ovarian extract, here the administration of ovarian extract brings about in many instances delightful results. I wish to repeat again that bromides, bromural and allied drugs are of much value in association with thyroid extract, ovarin or both.

Now these nervous phenomena which we look upon as the natural association with the menopause period, occur at various periods in a woman's life, as a result of ill-health, as a result of labor, as a result of prolonged nursing, as a result of malpositions of the ovaries or due to some anomaly between the glands. The patients in the interval between adolescence and menopause show many of the nervous phenomena so strikingly represented in the climacteric period.

Those of us interested in gynecology have been for many years at fault. Our attention has been devoted to the pelvic structures as found by actual examination and we have thought to place the burden of these phenomena on these. As a result there has developed the theory of reflex and reflex annoyances. There are found headache, palpitation of the heart, digestive disturbances, sleeplessness, irritability, restlessness, mental depression, general asthenia, and all been considered as due to malpositions of the uterus, malpositions of the ovaries, lacerations of the cervix, descent of the uterus, etc.

I have not found any reason to change my opinion formed many years ago, that these pelvic anomalies unless associated with pain, have little or no influence on the patient's general condition by reflex. If, associated with these pelvic alterations demonstrated by tactile sense, ovarian function is disturbed, there is immediately a faulty relation between the ovarian secretion and the thyroid and hypophysis, and as a result thereof we have at least one explanation of the various annoyances duplicated with marked regularity in the climacterium.

The hypophysis is here very often involved. Various asthenic annoyances are the result of over or under activity of the hypophysis, either the anterior lobe or the posterior lobe. There is the dry skin, the slow pulse, brittle hair, the mental asthenia so often characteristic of hypothyroidism. It is often difficult to distinguish between the two. In either of them, thyroid seems to have a very marked influence, a better influence in the hypothyroid cases than in those of hypophysis involvment.

I may here go back for a moment to the element of menstruation and call attention to that form of hypophysis alteration known under the name of Dystrophia Adiposo Genitalis. The patients take on weight gradually, become quite obese, menstruation diminishes and often ceases, the uterus atrophies. Here ovarian secretion is indicated, but in many cases is absolutely valueless. A combination of ovarian secretion, thyroid gland extract and hypophysis extract (the whole gland), may bring about a valuable result, but many cases are progressive and nothing can be done for them.

Coming back to the form of anomalies found in the pelvis, formerly believed to be the cause of nervous and other symptoms as a result of reflex, I do not by any means underestimate the value of treating these conditions. The uterus can be put in normal position and held in proper place, ovaries can be put in proper position and their circulation assured by medical measures or operative, weakness of the pelvic floor should be corrected. Anything which increases the physical nerve resistance of the patient is of value. The rest associated with a rest-cure, also postoperative rest is of the greatest importance.

All these benefits resulting from local or medical measures should not blind us to the fact that because we are correcting these things and because there is an improvement, we have obtained our advantage as a result of a restoration of a balance between the various glands. There is no unanimity on this question as yet, and there is need in this matter of a close study of every individual case.

Let us fix our attention now for a moment on the element of sterility. Suppose that spermatazoa are present, that there is no inflammation of the tubes, no peritoneal adhesions, and that the uterus is normally developed or somewhat hypoplastic, yet no pregnancy results. We know that the ovum makes its way to the uterus through the activity of the ciliated epithelium in the tube. We know that these ova must find their exit from the ovary through the breaking of a Graafian follicle. There are many cases where the ova do not break through, there is a lack of punch, so to speak. There are other instances where the ciliated epithelium is not active.

The ovarian secretion has a marked influence in preserving the activity of the ciliated epithelium. The thyroid probably has an important effect in activating the cilia. The trophic control over ovulation and action of the cilia on the part of the hypophysis may be a controlling factor. It is highly probable that anomalies of hypophysis secretion, especially in the posterior lobe, have much to do with the inhibition of ovulation and the formation of so-called "small cystic degeneration" of the ovaries. In many of these cases pregnancy may result only through the resection of these abnormal portions of each ovary followed by the administration of ovarin, thyroid and hypophysis extract. I am able to report several successful cases of this character. I have found in my experience that without operation cases may be benefited if we give large doses of ovarin and thyroid often with hypophysis extract. This combination has a stimulating influence on the uterus and its lining, resulting in the production of a normal decidua. They stimulate the activity of the ciliated epithelium of the tubes, push the ovary on to new energy and probably aid in the rupture of follicles which otherwise might remain in an unripe atresic state.

Operations on the ovaries themselves when filled with atresic follicles, administration of the two drugs that I have mentioned, have brought into the field of my observation in recent years, a class of patients formerly not benefited by dilatation and curettage. I do not mean to say that stenosis of the cervix, overgrowths of the cervical mucosa, overgrowths of the endometrium are not frequently benefited by dilatation and curettage and result in pregnancy, but there are no fixed symptoms defining these classes. We have to examine each patient separately and frequently until we come to a conclusion. As an aside I may mention that in a large number of cases the tubes are involved by inflammation, the outer ends are closed and it is impossible by tactile examination to make this diagnosis. I am more and more surprised each year to find a large number of cases in whom an abdominal section will show this condition to be present where frequent and repeated tactile examinations led us only to suspect that this condition existed. All of us know that we open the abdomen expecting adhesions, having supposedly felt them with our fingers, only to find that our tactile sense deceived us.

There is a condition in women known by the name of asthenia. It may be local, it may be general. Women are prone to consider that the cause of their weakness is due to some genital anomaly. And sure enough it is only necessary for a woman to consult enough physicians to find one or more who will tell her that her lacerated perineum, the scar in the cervix, a retroversion or retroflexion, a descent of the uterus, prolapse of one or both ovaries are the responsible factors.

I wish to call attention to this condition of asthenia. It often comes to our observation in patients who have not conceived. We see it, however, more frequently in patients who have borne one or more children. There are patients who after the birth of one child never return to their former state of elasticity. There is a relaxed abdomen, there is an enteroptosis, there is a movable kidney on one or both sides, there is a gastroptosis, there is a lack of tone in the vascular system. These patients have inherited this state. It simply needed one or more labors and the lack of proper involution locally and generally to bring out the symptoms. These patients deserve the greatest care postpartum, convalescence requiring as many as three, six to nine months with rest, massage, drugs, etc. It is in these patients who come to us for the first time that we can find marked benefit in the administration of the internal secretory glands. The two of the greatest benefit are the thyroid gland and the hypophysis gland.

The thyroid gland is an activator of the general system. It should not be given in cases where hyperthyroidism exists or is suspected. The administration brings out more actively the symptoms of hyperthyroidism and for this reason thyroid is an excellent aid to our diagnosis.

Many cases of asthenia are associated with diminished thyroid activity and altered hypophysis and adrenal function. Administration of hypophysis extract means giving the whole gland extract. For the adrenal element, suprarenal extract is excellent. Often we give one, two or all three in combination. You simply have to experiment and try. Many cases of asthenia, if prolonged and continued doses be given, improve decidedly. Of course it is needless to expect benefit from glands extracts alone to be sufficient. Iron should frequently be used, and attention to the intestinal tract is necessary. Rest is of value. Arsenic, iron and the hypophosphites are most important as drugs. After all, whether hypophysis extract be the specific thing or no, it is at any rate a most valuable adjunct.

From this brief review of the action of the various internal secretory structures, extracts of which may be administered by mouth, we see only a few types which stand out as distinctive. Any alteration, of one of the three glands to which attention is directed, which is of very marked degree, does bring out symptoms which scarcely can fail to be recognized. But a large number of patients have these alterations in a minor degree, in some cases slight in character, in other cases transitory, in other cases alternating from the type of one to the type of the other as the relation between the various glands changes for various reasons. The resulting symptoms affect not only the pulse, the menstrual function and the circulation, but the involvments vary in the most puzzling way. Digestion may be upset, constipation may be the result and various forms of nerve annoyances are frequent. There may be stages of excitation, stages of depression or alternations between them. Mental energy may be impaired, there may be extreme irritability or decided lethargy.

No one claims that these conditions are all due to an upset of the internal secretory organs. As physicians, we know too many causes for these conditions. It requires a diagnostic ability above the average to dissociate the cases due to local physical causes, such as of the heart, of the digestive tract, of the kidneys, etc. Only a knowledge of the physiological action of these various secretory organs and of their inter-relation can put us in a position where we may differentiate the various causes, and even then we have innumerable instances where no definite conclusion can be reached early. If, however, we know the action of these various secretory glands when given as extracts, we may by their use and by noting the resulting effects, differentiate between the various causes. This requires not a study of a few weeks, but observation of one's patients for the whole term of one's experience.

I trust that by having called attention to my points of view I may have stimulated a desire to investigate this question further, for I am firmly convinced that in the field of medicine, in the field of neurology and in the field of gynecology especially, one cannot do justice to his patients, one cannot bring about a cure unless he has mastered to a certain degree, a knowledge of the physiology and pathology of the internal secretory organs.

We now come to the posterior lobe of the hypophysis, the extract of which exerts the most pronounced and specific influence. Before going into a discussion of this subject, let me digress for a moment into the physiology of the question.

A woman menstruates because the ovarian secretion produces a certain trophic, hyperemic influence on the uterus and its lining. In association with menstruation an ovum is thrown off from a Graafian follicle. If no fecundation takes place, this Graafian follicle heals and leaves only a scar. If fecundation does take place, this Graafian follicle does not regress, but forms a true corpus luteum or yellow body.

This body is formed in response to stimulation produced by the impregnated ovum in the uterus when menstruation does not take place because of pregnancy. A secretion given off from the impregnated ovum nullifies the menstrual stimulation produced by the ovarian secretion. Not only does it nullify this menstrual stimulation, but the reaction produced by the presence of the ovum and the reaction produced by the presence of the ovum and the secretion which it gives off is responsible for the true corpus luteum which has secretory functions.

Many pregnant patients are nauseated and in certain instances these conditions are aggravated to a dangerous degree. This nausea and vomiting is in all probability due to the irritating effect upon the central nervous system of the secretory product given off by the ovum, particularly by its outer covering, the trophoblast. Hence the theory that injections of corpus luteum extract benefit the emesis and hyperemesis of pregnancy.

During pregnancy there is a change produced in the various secretory glands of the body. A specific reaction is produced in the hypophysis gland. The hypophysis gland (anterior lobe) in a pregnant patient undergoes typical structural changes which never entirely disappear. The posterior lobe is inhibited to a certain degree.

Now, on the two hundred and eightieth day the average patient goes into labor. On the two hundred and eightieth day some change in balance takes place between the various glands of the body, particularly between the hypophysis, the ovary and the placental secretion.

Labor is a magnified menstruation. Menstruation is a miniature labor. Therefore the function of menstruation is, so to speak, restored at the labor period and is supplemented by specific activity of the posterior lobe of the hypophysis. One may inject large amounts of pituitary extract during the various months of pregnancy, up to the very last day, with absolutely no effect; but once labor begins, either with recognized pains or with irregular pains or with a rupture of the membranes, pituitrin comes into its own. We readily see that some relationship of a new character is established. Some inhibitory influence is removed and some stimulative power comes into being which gives the pituitary gland at this period a specific influence. The eventful decision as to just what takes place in the production of these changes will be one of the most important contributions to the study of labor.

If castor oil followed by quinine be given to a pregnant patient very near or at the expected date of labor, and if this be followed within a few hours by repeated injections of pituitrin in doses of two to five minims given every half hour, the patient will go into a normal labor with regular rythmical pains. This method is successful in the vast majority of multigravidae and in about half of the primigravidae. The probable explanation is to be found in the fact that castor oil and quinine sensitize the uterus and decidua and aid in removing the inhibitory influence which the placenta has been exerting on the contractile powers inherent in the posterior lobe of the hypophysis and its secretion.

The injection of pituitrin then exerts its well-known influence on the uterus as well as on the pituitary gland itself. This method if attempted two or three weeks or even a few days before full term (especially in primigravidae) is ineffectual.

The whole question of the administration of pituitrin in labor can be summed up in a very few phrases. It should be given in small doses, not more than two to five minims of an ampoule. It should be given at intervals no shorter than a half-hour. It should only be used when conditions are perfectly normal; by that I mean in primigravidae the relation of the head to the pelvic bones. The head must be firmly engaged in and through the brim. This extract intensifies the labor pains and makes them efficient. Therefore it may be used when no progress is being made. When the membranes rupture before pains begin it takes in some cases from several hours to several days before labor pains come on. When the membranes rupture prematurely and conditions are normal, if pituitary extract be given, it starts the labor pains within a very few hours and it practically shortens the period of waiting. If a Barnes bag or a Champetier de Ribes bag be introduced into the cervix for the induction of labor, if pituitary extract be used just so soon as indefinite pains or discomforts are experienced in the pelvis, the patient goes on into a rhythmical series of labor pains and it is most rare that a second bag must be introduced.

In Cesarean section, if at the time of incision into the skin, a hypodermatic injection of pituitary extract be given, it produces a rapid contraction of the uterus so marked that after expression of the child, the membranes and the placenta, the uterus contracts most decidedly and there is scarcely any bleeding from the mucous lining and absolutely no bleeding from the cut margins of the uterine wound.

In labor (at the end of the second stage), chloroform or nitrous oxide should be used. Attention must be called to the fact that chloroform inhibits the action of pituitrin. After its administration the pains come on less frequently and with less force. Hence it may be necessary to give the pituitary extract at shorter intervals than those of half an hour. Care must be taken in this procedure for the simple reason that so long as the patient is not completely under the anesthetic she uses the voluntary expulsive power of the abdominal muscles. These voluntary forces supplemented by unusually strong contractions on the part of the uterus, may expel the child more rapidly than we wish with lacerations of the perineum.

Many have spoken of the tendency of the uterus to bleed decidedly after the use of pituitary extract, that is during the third stage of labor. I can readily understand this. The purpose of pituitrin is not to contract the uterus alone, it simply increases the force of uterine contractions. There are periods of marked relaxation. It is quite possible that during a period of relaxation bleeding may result even of a most pronounced nature. This is not my experience for the simple reason that I do not use pituitary extract in the third stage or in the post-partum stage. I use ergotole or ernutin. Immediately after the birth of the child a hypodermatic of ernutin or a dose of ergotole by mouth is given. Hence after expression of the placenta we get a more decided contraction of the uterus without relaxation than is the case when pituitrin is used. Hence I believe that for this reason my experience as regards post-partum hemorrhage is better than that of most men who have been using pituitary extract.

Excellent as are the results of pituitary extract in primigravidae, the result in multigravidae is most startling. One may never give even a small dose of pituitary extract to a woman who has already had one child, and leave the patient; for one never knows how quickly labor may progress. It is no exaggeration to say that I have seen pituitary extract deliver a patient in from twenty minutes to a half-hour when the head was not firmly engaged in the brim and the cervix by no means completely dilated.

It may be taken as a general rule that multigravidae who are in labor will deliver themselves in a large proportion of cases with the aid of pituitrin in a period of less than three hours.

In conclusion let me say that if the use of pituitrin has done nothing more than to diminish decidedly the need for forceps, it has added a safeguard to the practice of obstetrics.

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THE CANCER CAMPAIGN QUARTERNARY: THE PROBLEM; THE PUBLIC; THE PATIENT; THE PHYSICIAN.

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(Continued from the May issue.)

So far we have encountered only differences of opinion concerning the cause of cancer, but nothing that may be unqualifiedly pronounced a *fact*. What, more than mere hypothesis, may we say relative to this basic element of the great unknown? Is there nothing upon which all those who are interested in helping to eradicate this plague may earnestly unite, something which will materially aid in checking its ravages? Unfortunately, there seems to be no ground upon which all may stand so far as the *essential* cause of cancer is concerned. There are some dissenting voices, however feeble, with regard to the *predisposing causes* and the *local origin* of the disease; but the accumulated evidence, gathered from all over the world, from all manner of sources, from animal and other laboratory experiments, and from clinical observations so numerous as to seem to refute all opposing opinion, warrant at least the statements:

(1) That, notwithstanding the possibility of underlying general factors, cancer may, for all practical purposes, be at present regarded as local in its beginning.

(2) That prominent among the predisposing factors, for which one should be on guard, are: general lowered nutrition; chronic irritation and inflammation; repeated acute trauma; cicatricial tissue, such as lupus and other scars, and burns; benign tumors—warts, moles, nevi (birth-marks), etc.; also that changes occurring in the character of such tumors and tissues, as well as the occurrence of any abnormal discharge from any part of the body, especially if blood-stained, are to be regarded as suspicious.

(3) That some occupations, notably working in pitch, tar, paraffin, analin or soot, and with X-rays,

if not safe-guarded, are conducive to the production of cancer, presumably on account of the chronic irritation or inflammation caused.

(4) That the finding of any abnormal condition about the body should be taken as an indication for competent professional and not personal attention.

Prevention.—It goes without saying that so long as we have not determined the cause of cancer we cannot definitely say that any given course of action or state of being may be counted upon to prevent the development of the local condition which we recognize as cançer. From long observation, as we have just seen, it has been determined that certain factors predispose to the initiation of the malignant process, and we are justified in warning against these factors, thereby placing the public on guard concerning them. We should not, however, be so zealous in our efforts to impress these predisposing factors as to be blind to other possibilities which may controvert our present stand. While busy with the problem of protective immunity, yet us not brush aside as of no moment the proposition that heredity is a possible factor in the initiation of cancer, and therefore must be reckoned with in the prevention of the disease. But we need not (as some have done) become so imbued with the idea that heredity has been *proved* to play a part, as to advocate celibacy in those in whose person or family cancer is known to exist or to have occurred. Nor need we advocate the isolation of persons afflicted with cancer, or other extreme measures in keeping with the prevention of infectious or contagious diseases, because one school of cancer investigators persistently holds to the belief in the infectious nature of this disease. Let us continue to work, each in his or her own way, along lines of preference, looking to the solution of one or more of the enigmas and the ultimate complete analysis of the entire problem. But in the interim let us try to keep the public out of the investigation of the various theoretical and technical questions. Let us not do more than urge watchful waiting, along the lines indicated above, until decisive action is called for; but let us make it unmistakably clear that action, when needed, is the surest aid to the elimination of this malady, by the prevention of its occurrence or its eradication in its incipiency.

Cure.—It has been urged by those who oppose the "cutting" of cancer, or who recommend the surgeon as a recourse of last resort, that the word *cure* is not applicable to cancer when the means employed are of a surgical nature. There is perhaps no more completely and ineradicably fixed delusion in the public mind than that cancer never is really cured, and that if it is cured it was not cancer. It is because of this idea, no doubt, that the public is always ready to accept on faith the latest therapeutic gallimaufry which is exploited. And yet the most tangible phase of the entire obscure problem of cancer concerns its cure. We come more nearly here to fighting cancer with facts than anywhere along the line. For such an accumulation of experience and observation is available to prove that cancer is cured by early and complete removal of the local manifestation which we call "the growth," that this evidence would seem sufficient to convince even the most skeptical. And, forsooth, it would, were it not for the fact that this particular variety of skepticism is incompatible with the scientific attitude of suspended judgment pending proof. It has, moreover, kept alive the aforesaid constitutional theory of the origin of cancer, with various collateral theories concerning diet and habits of life. Out of these theories, quite naturally, have come various methods of treatment, ranging from Christian Science to Rice Regime.

THE PUBLIC.

It is particularly with regard to the question of the cure of cancer that the medical profession, as a whole and individually, should assume the responsibility of safeguarding the public from conflicting opinions, and the consequent lack of confidence in medical advice, with its concomitants, neglect, or the following of false gods. And yet there has been and still is a deplorable lack of unanimity in our views.

I have repeatedly had occasion to discuss the question of "cancer cures," and to deplore the fact that false hopes are constantly being aroused in the public mind by premature reports of "success" with this or that agent or method.

Radium is at present the storm-centre of conflict in this regard. The public is told by one authority (perhaps not intentionally), that "radium, our newest therapeutic agent, is proving to be of the utmost value in the treatment of cancer of all kinds, whether operable or inoperable." By another the public is told that while this agent "will continue to be of value in the treatment of certain small, relatively benign, accessible cancers, . . . as yet no consistent benefits have been obtained in deeper tumors." On the other hand, reports have been published in medical journals (and the information appropriated by the public) of deep-seated cancers "cured" by radium, while other reports tend to show that radium, "even in large doses, and when administered by some of its greatest advocates, is by no means infallible in the superficial cases that it is stated to cure," but, it is added, has made such cases vastly worse.

The public, meanwhile, reads of the thousands spent for radium and radium products by one set of investigators, and of the doubt cast by another faction on the entire radium idea. One expert says: "Give me enough radium and I will cure every case of cancer;" another says: "Would that radium had never been discovered!" And the public loses faith alike in the advocate and the decrier of this agent.

The same uncertainty confronts the public with regard to X-ray. "It cures;" "it should be used after operation in every case of cancer;" it is of little or no benefit;" "It is positively harmful because it stimulates the growth of cancer," — these and many similar statements may be found in campaign literature or heard in campaign lectures.

As for other so-called cures—and I have reference here not to the agencies employed by the patent quack—the public no sooner rids its mind of the hope aroused by the advocates of one "new remedy," before another is foisted upon it by reputable members of the medical profession.

The fact that the public receives much of its medical information through the newspapers, "hunting for something dramatic for their columns," should tend to make the profession much more guarded than it sometimes is in making statements concerning cancer and its treatment. Careless phraseology, which to the initiated is taken as intended, may be honestly misunderstood by the public, and for this reason, physicians, on general principle, should avoid such phraseology in dealing with a subject concerning which they have assumed to educate the public, and concerning which the public, in consequence of the proffered education, considers it has a right to knowledge from this source. If a layman reads, for example, or hears, that "while radium *manifestly* (the italics are mine) *ought to replace surgery in many instances,* and while it does some of its best work in *curing cases which surgery has not the remotest hope of touching,* yet on the whole there remains a large place for radium combined with surgery," etc., he is fairly sure to conclude that the author of such a statement means that radium can and does cure at least some cases which surgery is powerless to benefit. Yet how many such cases can be presented? Are we fighting cancer with *facts* when we make such assertions, even among ourselves?

It must be confessed, however, that the public is not without blame in blocking the dissemination of useful information—or at least not harmful—concerning cancer. The intellectual proletariat may be excluded from this accusation, but those in high places in the world of letters are sometimes the gravest offenders. I have elsewhere directed attention to the unique and spectacular stand taken by one of the great editors of a few years ago, with reference to "cures" for cancer. Editors of to-day, with seemingly no realization of the evil that may ensue, allow the appearance of columns of sensational matter concerning cancer calculated to mislead their readers. Some of this—much, perhaps—is traceable to errors of judgment on the part of the medical profession; but much of it emanates, directly, from the aforesaid high places in the world of letters. A notable instance may be cited in the lengthy and positive advocacy of "red clover tea" by a facile and popular writer of the day, whose means of expression reaches at once thousands more than our campaign literature may be expected to reach in months or perhaps years.

A part, therefore, of the campaign of education should be directed toward impressing upon the public that if the hundreds of earnest workers in laboratory and in clinic are unable to discover ways and means, other than surgical removal, for the cure of cancer, it is a foregone conclusion that traditional remedies, such as "red clover tea" and the thousand and one things that have been listed as cancer "cures," are to be considered time-wasters, and their advocates false teachers.

Too much emphasis cannot be placed (and not enough has yet been given) by the disseminators of knowledge concerning cancer upon the fact that of the large number of "failures" to cure this disease by surgical means many may be charged to ignorance or neglect, or both, on the part of the patient, rather than to any inherent fallacy in the method of treatment. In this connection, unfortunately, the medical profession, in part, is not blameless, for there are still many who prefer to treat "relatively benign," superficial and accessible growths with caustics, electro-cautery, X-ray, radium, or some other non-surgical means. This being true, the task of impressing the public with the importance of the role they must play in the reduction of mortality statistics is rendered more complicated and needlessly difficult.

THE PATIENT.

In a previous communication* I endeavored to emphasize some of the difficulties encountered, from the patient's point of view, in the search for knowledge concerning and relief from cancer. These difficulties, so far as I am able to judge from my own experience and observation, have in no degree been lessened during the twelve months of campaigning which have elapsed since the appearance of this article, along with many others which appeared coincidently over the country, all intended to emphasize some phase of the campaign of education concerning cancer.

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*"The Cancer Patient's Dilemma. A Plea for the Standardization of What the Public Should be Taught in the Campaign of Education Concerning Cancer," New York Medical Journal, July 3, 1915. (The conclusions of this paper, under the title, "Articles of Faith" Concerning Cancer. A Platform Upon which to Unite in the Campaign of Education, were presented by the author during the four-day Cancer Educational Campaign, held under the Auspices of the Vermont State Medical Society, June 8-11, 1915).

It is doubtless true, as has been repeatedly stated that the campaign of education has yielded results in the matter of causing more persons with premalignant and early malignant conditions to consult the surgeon, dermatologist, or family physician, and this, to be sure, is the prime motive of such a propaganda so far as the patient is concerned. But is it not possible to inculcate the idea that no chances are to be taken with these supposedly precancerous warts, moles, etc., that menstrual disorders, especially of middle life, should not be neglected, that bad teeth should be attended to before they have inaugurated a condition of chronic irritation in their vicinity, and that the various other predisposing factors should be borne in mind, without introducing the Mendelian theory of heredity to clinch our arguments, without telling the patient of the many things which recent experiments on hordes of animals have *not* proved,—without, in short, clonding the issue with any of the debatable question now before us? The patient need not be shown "cancers in plants" and to be told that these are similar to cancers in man, leaving the grotesque impression that cabbage, cauliflower, asparagus, or any other succulent and otherwise wholesome article of diet may be the host of a death-dealing disease, and that, if consumed, the host of the disease is changed from the vegetable to the consumer. Nor is it necessary to bring forward figures, mostly of ancient origan, to convince the patient that he must beware absolutely of a meat diet if he would escape cancer. Still less is there need for restricting the patient's diet in keeping with that of "far Cathay."

In short, once the patient has reached the point of consulting a medical adviser, the condition and not a theory is the paramount issue.

THE PHYSICIAN.

The second element of the four which, as I have said, are the chief constituents of the problem of cancer (cause, diagnosis, prevention, cure), so intimately concerns the last member of the cancer quaternary, the physician, that I have left it for further consideration in this connection.

I have repeatedly emphasized my belief in the necessity for beginning any crusade of education concerning cancer within the ranks of the medical profession. The reason for this is fourfold (if I may use another figure four), and is to be found, in tangible form, in the doctor himself.

So far as the campaign of education is concerned, physicians seem to fall into the following groups:

First, those who are so placed in their respective fields of action that they see very few cases of cancer, and for this reason are not so skilled in the diagnosis of this condition as others. Such practitioners are not confined to the rural districts, but may be found in smaller and larger cities as well. Inasmuch as, in the absence of dependable laboratory or other diagnostic tests applicable to the early stages of cancer, the recognition of the disease during these stages is entirely a matter of experience, physicians lacking this experience form the chief object of campaigning. If it is impossible for them to avail themselves of the large clinical material of the leading cities, through hospital interneships, post-graduate courses, or other avenues, then the duty should be made clear to them of referring all doubtful cases to those of larger experience.

Second, those who may be called medical optimists. Nothing is the matter with the patient of this type of physician — found everywhere — until direful illness is imminent. The tendency of these over-hopeful doctors is to pooh-pooh the early stage of practically all diseases. Cancer is certainly no exception. Warts, moles, lumps, bumps,—all alike to him, are "nothing at all." Menstrual irregularities are due to cold or exposure in young women, and to "the change of life" in those who are older There is no digestive disturbance so persistent as to be inexplicable to him on a basis of improper diet, constipation, lack of exercise, or imagination. Such medical optimists are not the least difficult subjects for enlightenment in the campaign of education regarding cancer.

Third, those who, in contrast to the second class, may be called medical pessimists. They see in every lump or bump a corroding cancer, and in every menstrual disorder the necessity for a panhysterectomy. Needless alarm and mutilation are the inevitable results of such an attitude. Closer study of the individual case and keener analysis of signs and symptoms will obviate the difficulty in a large proportion of these cases. It is from such an angle that this particular class of physicians should be approached in the campaign of enlightenment.

Fourth, those who are not lacking in experience, who are neither optimists nor pessimists, and who constitute the remainder of the medical profession, to which the campaigners themselves belong. The difficulty here—and it is no inconsequent difficulty —is the lack of unanimity. We are endeavoring to teach *facts* about cancer, when we have not determined what constitutes fact, except with regard to a very limited number of the questions involved. None of us are infallible in the matter of diagnosis, but once the conclusion is reached that a given condition is malignant, the treatment should be instituted in accordance with the facts of accumulated experience. No amount of theorizing can or has disproved the truth of the conclusion that accumulated experience warrants radical surgical removal, from the earliest stage to that which may be advisedly pronounced irremovable.

Many cases have been cited in which the tampering methods of the first class of physicians, the inexperienced, have unwittingly led to disastrous delay. The same unfortunate results have been chronicled as the outcome of the "Oh, let it alone!" advice to the patient who, perhaps, has come under the spell of the advocate of education regarding cancer, who has honestly sought the early advice recommended. The woman, then, with the "lump" in the breast, or the man with the "crack" in his lip, goes out from such a medical adviser saying, "I *thought* that lecturer about cancer was an alarmist. I am glad I went to see Dr. So-and-So, for I was really frightened until he told me it was nothing." Perhaps it was not anything; but perhaps it *was*. The consequence in the latter case will be just as the cancer campaign lecturer predicted it would be. And this state of affairs is perhaps more common, and certainly more distressing, than that which is the outcome of the pessimist's advice, bad as it is. Fear, dread, and perhaps nervous and psychic upsets, on the part of the patient, unintentional neglect and avoidance on the part of friends and relatives of persons afflicted with cancer, are some of the results of the tendency to give a diagnosis of cancer too rashly. The diagnosis, if accepted, leads to treatment with the object of removal of the suspected lump or bump or other abnormality, by surgical means, by cautery, by radium, or other agency, according to the views of the physician consulted. In many instances, some of which I have cited elsewhere, unnecessary and mutilating operations have been performed as the result of this attitude on the part of the physician. The medical man who, lacking neither experience nor diagnostic skill, *denies* to his patient the benefit of the only method of treatment which has stood the test of time, namely, surgical removal, just as surely adds his quota to the list of failures as do physicians of any other class.

With the higher perceptive ability which an earnest and unified education should develop, the physician of the near future should be able to catch the faintest whispers from Nature and give them back to the waiting world with clarion-like reverberation.

A DISPLACEMENT OPERATION FOR GUNSHOT NERVE INJURIES.

DR. J. F. S. ESSER,
Dutch Special Surgeon for Plastic Operations (at present in Vienna).

The displacement of the ulnaris and radialis (musculo-spiral) nerves as carried out by Wollenberg (Berlin) and Polya (Budapest) had, like the procedure of Wrede, the purpose of making it possible to unite the nerve ends by shortening the nerve bed. They deplaced these nerves from the extensor to the flexor side which was shorter for them.

In May, 1915, when I was chief surgeon in Brünn in k. u. k. Receivespital Nr. 2, I carried out on my own initiative, the deplacement of the radialis and other nerves. I made these radialis deplacements until the end of 1915 in thirteen cases. Later, in Vienna, where I had quite different material to work upon, I had unfortunately no more opportunity of performing the same operation.

My displacements had, however, quite another purpose and procedure than those of the surgeons mentioned above. I shall describe it as applied to the radialis nerve. The purpose was only to protect the nerve from the surrounding scars and latent inflammation, by displacement instead of the usual procedures of surrounding the nerve with protecting calf arteries, veins, fascia, etc. These envelopments can all be considered as free transplantations and I am of the opinion that, in consequence of the bad conditions, one cannot believe that these uniformly heal and remain alive. In favorable cases an aseptic absorption process, in these alien parts is rather to be expected. An envelopment of the nerve with a pedicled muscle flap, always seemed better to me, but even this procedure was not as perfect as is displacing the nerve into a healthy normal muscle interstice. Either the pedicled muscle flap is well provided with sufficient vessels and nerves and then it will continually move and draw on the nerve, or the pedicle has not sufficient innervation and vessels, and then the purpose of the operation is defeated, for the muscle disappears or becomes connective tissue.

The nerve is freed over a long distance, both at the place of the injury, as well as above and below, with the very greatest care and patience, in which process the chisel must often help, for the nerve ends are very often surrounded by callus bone-pieces. The nerve ends must be prepared and freed from every particle of connective tissue, so to say, under the magnifying glass. In order to do this perfectly and without haste, I always operated under plexus-conducting anesthesia (Kulenkamp) so that half an hour, more or less, was of no importance. The plexus-anesthetic demands extreme exactness, patience, and extensive practice, but it offers ideal conditions, which fully recompense for the time and trouble spent.

In all the thirteen cases, I could find remnants of the nerve connection of both ends and I consider this of great importance; be it, that the "bud," the "autogen" process, or both together, play the chief rôle in the healing. Suppose that in some cases this connection was so slender, that one could not ascribe great practical importance to it, respecting innervation, conducting or leading the growth, still the great importance remains that one knows that the patient has had no disadvantages through the operation—not to mention that the patient may have profited at the same time by the operation. The indication of the operation is ruled by this.

In none of the thirteen cases was a diminution of the nerve function proved by examination of the active movements and the electrical susceptibility and agitation, directly after the operation. Among the cases there were some of old, stabile pareses.

In two cases I met with a strikingly quick healing in a few days. Such is also mentioned by other authors.

Therefore I believe that with this operation, the indications can be made broader than the nerve specialists at present propose. I even think, it is to be considered whether every radialis injury with paralysis is not to be operated upon at once, whether the galvanic susceptibility is strongly diminished, or not. Verebély (Budapest) recommends in a careful, beautiful work on injuries of the nerves (*Pester med. chir. Presse,* 1915, Nr. 39, etc.) so operate after at least four or six weeks.

The technic of my procedure was, that after almost perfectly clean preparation of the injured nerve, the massive ends were joined by sewing the nerve sheaths together with the finest vessel sutures. After that, the thin connection which had been so carefully prepared beforehand, hung like a free loop. The muscles brachialis int, and triceps were then sewn together underneath the elevated nerve, and then the liberated nerve was laid in the groove between these muscles covered only with subcutaneous fat and skin.

In Brünn (Moravia) when in 1915, I showed some surgeons my method, and the patients operated upon in this way, my procedure found imitators who were fully satisfied with it, as I heard afterwards.

I myself had good results even with cases of sixteen months old paralyses.

ENUCLEATION OF THE EYE WITH IMPLANTATION OF THE PATIENT'S FAT INTO THE CAVITY.

John M. Wheeler, M.D.,
New York.

Abundant evidence of general dissatisfaction given by the ordinary enucleation of the eyeball is found in the multitude of modifications which have been proposed by ophthalmic surgeons—modifications designed to give the victims of enucleation the best possible cosmetic results. After the removal of globes and the introduction of glass eyes, the results are liable to be disappointing for several reasons. The weight of the artificial eye in time causes the lower lid to sag, and the eye takes a position noticeably lower than that of the unoperated eye. A tilting is also apt to occur, so that the upper margin falls considerably back of the plane of the lower margin of the prosthesis. Invariably there is a sinking back of the glass eye caused by the shrinkage of the orbital tissues. Resulting from these processes there is a noticeable drooping of the lower lid, the formation of an unsightly sulcus under the orbital arch, with partial or complete obliteration of the normal folds of the upper eyelid. The false position assumed by the lids sometimes interferes with the drainage of tears, and epiphora results. The hollow Snellen eye offers the appearance of greater prominance than the ordinary shell, but it gets practically no support from the contracted stump, and sagging results. De Schweinitz[1] has said, "An enucleation which pays no attention to the preservation of the relationship between the conjunctiva, ocular tendons and capsule of Tenon, is a brutal operation which should not be performed unless the disease of the globe and surrounding orbit is of such a character as to render this precaution impossible."

Recognizing that the ordinary enucleation gives a high percentage of results which are displeasing to both patients and surgeons, many ophthalmologists have suggested the introduction of different kinds of foreign bodies into the cavity which results from removal of the eyeball. Among these substances may be mentioned balls of glass, gold, platinum, silver, pitch, paraffin, silk, sponge and eyeballs taken from rabbits and other animals. None of these foreign bodies has been entirely satisfactory on account of irritability to the tissues, disintegration, absorption, breakage, extrusion or sympathetic irritation.

The introduction of fatty tissue into the capsule of Tenon after enucleation of the eyeball was first proposed by a Mexican surgeon named Barraquer,[2] who reported excellent results. Many eye surgeons recently have adopted the operation, and several modifications have been suggested. Almost without exception reports have been favorable to this procedure.

The technic which I prefer is as follows: Ether anesthesia is employed. The globe is enucleated with care to save all the tissues outside the sclera, and to injure them as little as possible. Before each muscle is cut from the globe it is clamped at its insertion with a muscle forceps. After cutting the superior rectus and the internal rectus, while the muscle clamps are still on, both needles of double-armed fine catgut sutures are passed from the globe side through the tendons near the cut ends. Then the inferior and external recti are clamped and cut, and the forceps are left on and the enucleation is completed. Pressure is applied with sponges to control hemorrhage and the oozing is allowed to stop while the fatty tissue is being excised from the patient. An incision about an inch and a half long is made in the inner aspect of the thigh, where plenty of fat is to be found even in thin subjects. A piece of subcutaneous and fatty tissue somewhat larger than the normal globe is removed, and deposited into Tenon's capsule. While the muscles are held taut and spread apart by holding the forceps and sutures, this fat should be forced back so as to protrude into the orbit through the openings in Tenon's capsule. An assistant holds the fat back in the orbit with anatomical forceps while the surgeon sutures the muscles over the mass. The needles carrying the gut suture which loops the tendon of the superior rectus are carried through the tendon of the inferior rectus (entering from the globe side) and the suture is tied. This results in a slight overlapping of the tendons. Similarly, the needles which have been passed through the tendon of the internus carry the suture ends through the tendon of the externus and these tendons are tied together. These rectus muscles hold the fat pretty securely, and it no longer has to be held back with forceps. Now the margin of the capsule of Tenon is caught up by a purse-string suture of fine gut and tied. Finally, the conjunctiva is dissected from Tenon's capsule a little and then sewed by vertically placed interrupted sutures of fine silk, so as to make a horizontal conjunctival wound. If this technic is followed the fat will not present in the wound, and will not slough. Some swelling of the lids follows the operation, but this subsides in a few days. The sutures should be removed from the conjunctiva in about a week. If the thigh wound is carefully closed by silk sutures, it heals by primary union.

About three weeks after the operation a shell can be worn, and this will fit snugly over the mound of fat and cling to it. Probably slow absorption of the fat goes on for months or years, particularly in emaciated subjects, but enough remains to preserve a good stump.

Among the advantages which can be justly claimed for this procedure are:

1. Good motility of stump and artificial eye.
2. A thin and light shell can be worn, and this is held in good position as to proper prominence and proper tilt without having to rest on the lower lid.
3. The lachrymal drainage is usually good.
4. The orbital tissues are not required to retain substances foreign to them.
5. There is no danger of sympathetic ophthalmia due to the presence of the fat, and nothing has been introduced which can be broken or extruded.

REFERENCES.

[1] De Schweinitz: The Comparative Value of Enucleation and the Operations which have been Substituted for it. Paper read before the Section on Ophthalmology of the 13th International Congress of Medicine, Paris, Aug. 2-9, 1900, p. 29.

[2] Barraquer: Enucleation ingerto de tejido adepaso en la capsule de Tenon. Archiv. de Oftal. Hisp.-Amer. Vol. 1, 1901, p. 82.

AUTOPLASTIC WHOLE THICKNESS SKIN GRAFTING OF AN AMPUTATION STUMP: A CASE REPORT.

JOSEPH H. FOBES, M. D., F. A. C. S.
NEW YORK.

For some years, especially in the European countries, a method of covering raw areas by the use of flaps of skin has been in vogue. Most of these areas were so located that a limb could be slipped underneath a strip of skin, attached at either end, and when circulation and healing were established, the ends of the strip could be cut and the strip sutured over the grafted area. The following case illustrates a modification of this method which is especially useful in covering amputation stumps and avoiding an amputation higher up on the limb with the consequent loss of length of the member affected.

Robert W., twenty-two years of age, came into the Volunteer Hospital, New York City, under my service, on August 14, 1913. He had suffered an accident in a machine which resulted in a denudation of most of the soft tissue from a point just above the wrist down to the metacarpo-phalangeal joints of the right hand. The interne replaced the flaps and sutured them, endeavoring to get union. The bloodvessels, however, had been injured so badly just above the wrist, that in a short time gangrene ensued necessitating, under ordinary circumstances, an amputation at the middle of the forearm.

I conceived the idea of amputating at the wrist, allowing the parts to recover from the septic condition in which they were, and at some future time covering the stump with a section of skin, connective tissue and fat from some other available part of the body, thus saving to the patient his wrist bones, and one-half of his forearm bones. August 22nd the amputation was done in the manner mentioned and the parts allowed to heal, leaving a granulating stump.

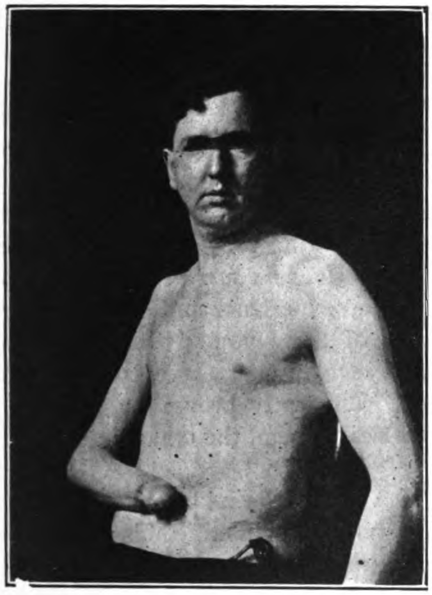

Fig. 1.

On October 29, 1913, at the Hahnemann Hospital, a pocket was made in the left quadrant of the anterior wall of the abdomen, including skin, connective tissue, and fat, down to the fascia. Into this pocket the stump was inserted and the skin flap sutured to the skin on the forearm.

During the night after the operation, the patient, who was an extremely hard one to handle, tore the dressings off, but with the assistance of the house-surgeon, Doctor Dupuy, the limb was replaced and after a rather long convalescence, on November 14, the flap had become firmly grown to the forearm. Then a sufficient amount of the pocket wall was incised and placed over the stump. Considering the poor quality of the tissue and the presence of a moderate number of staphylococci, the healing from this point was remarkably good, until at this date the patient possesses a firm cushion at least one and one-half inches thick over the end of the wrist bones. A rubber hand was applied and the patient assures me that the result is all that he could possibly expect.

During the dressings it was found that "scarlet red" remarkably accelerated the process of epidermalization. I regard scarlet red, and especially the amido-azotoluol, a most remarkable agent for the production of epithelia on a granulating surface and I have used this material since 1908 with great success.

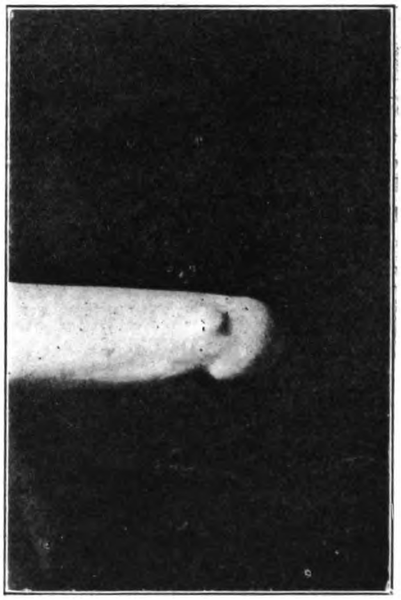

Fig. 2.

The points to be remembered in the application of this method are first, it preserves much of the continuity of limbs which would otherwise be amputated; second, it produces a firm, comfortable, painless stump for the end of amputated bones; third, an important point in the technique is the attainment of perfect drainage from a lower angle of the pocket; fourth, it is necessary to absolutely immobilize both parts, preferably by a plaster cast.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, JUNE, 1917.

YOUNG HOSPITAL GRADUATE, WHAT OF YOUR DUTY?

In the May issue of THE JOURNAL we called we called attention to the need of the U. S. Navy, and especially of the Army, for more medical men; and we urged upon every man in the profession to take stock of his talents and his experience, his age and his health, and to determine whether his greater duty is at home and to his community, or in the regular or reserve corps of the navy or army to accept service wherever his country may call him.

The number of medical officers in the army and in its reserve corps is still far below what will soon be needed. Thousands are required for the army divisions that are to be raised. They will all be needed as soon as recruit concentration begins. Many will be needed before that. Many have already been ordered to duty.

The need for more physicians in the military hospitals abroad is very great, the strain upon the medical profession of our allies during the past three years has been tremendous. Indeed, assistance in this field is one of the most pressing needs that have been brought to the attention of our government. In response thereto six base hospital units, some ambulance companies and several individual officers—all in the medical reserve corps and the enlisted reserve corps—have recently been sent abroad. More will probably be sent soon.

The call is not merely to our patriotism. It is a cry to succor the wounded,—a cry that needs no partisan stimulant to stir our pulses. Since the war began many American surgeons have given their aid abroad, as volunteers, without rank or compensation.

The honor of being the first to carry our colors across the Atlantic in this great war for democracy has fallen to the physician. The first to go, he will probably be the last to return, for a declaration of peace has no influence on the healing of wounds! For those medical reserve corps officers who have been, or stand ready to be, sent abroad, the sacrifice is great, indeed, for most of them are men over 35, with established practices and large expenses at home, whose army pay will fall far short of maintaining their families during their absence.

With this spirit of sacrifice as an example to them, what of the *young* men recently graduated or about to be graduated from the medical schools and, especially, the hospitals? Most of them have no dependents and no practice. For them military service now involves *no sacrifice*. On the contrary, it offers unusual experience and excellent pay. Why have so few of these young men sought commissions in the regular or reserve corps? Have we, their elders, sufficiently brought to their attention the duty that calls them, the opportunity that awaits them?

Those who are in the midst of their hospital interneships should complete them; they may be needed later and will then be better trained. But those who have recently completed, or are now completing, their hospital courses have, with few exceptions, no satisfactory excuse for failing to apply for commission in the Medical Reserve Corps. It is discouraging, indeed, to hear from the lips of some of them, "Oh, I'm not going in until I have to," "I'm not willing to be a fourteenth assistant," "I'd join if I could be sure I'd get operative work to do," etc. Such sentiments are not merely nauseatingly unpatriotic; they show gross ignorance of the work of the army medical officer and the needs of the hour. There is no service put upon commissioned officers in the sanitary corps that is beneath the dignity of *any* medical man. There is none, certainly, that the young hospital graduate will not be dignified in performing. Thousands of older men have accepted the commission for *any* work that is assigned to them. Why should youngsters look for assurances of better? Uncle Sam will try to place every man where his experience and ability can be best used; and every man with talent will have the opportunity to make that talent show. And if some are placed below those less worthy, what of it? The call is for *service*, and the young men, trained in our hospitals and unfettered by other obligations, who turn their backs on that call must answer to their consciences now—and to conscription officers later!—W. M. B.

THE AMERICAN MEDICAL ASSOCIATION.

The physicians of New York City have prepared to welcome, this month, the return of the American Medical Association to the metropolis for the first time in thirty years.

New York, the greatest city of the western hemisphere, and in many respects the greatest city in the world, has correspondingly more to interest the visitor than any other American city. Its very many, large and varied hospitals present a wealth of opportunity for clinical observations; and the demonstrations arranged for the first two days of the meeting are calculated to be varied enough and many enough to make this a new feature of the annual convocation, a valuable one.

The scientific meetings, at the Academy of Medicine and at the large hotels in its vicinity, will be conveniently to each other, and to those two famous thoroughfares, Fifth Avenue and Broadway.

The distraction of the war, the perturbation of those who await the call to active service, may disturb the single-minded interest that usually marks the scientific sessions; they may depress the spirit of the general meeting and the social events; but they will not lessen the sincerity of the welcome which the profession of New York extends to its visiting colleagues.—W. M. B.

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Surgical Suggestions

The prognosis of a surgical operation upon a diabetic is far more serious when the condition operated upon is directly related to the diabetes (e. g., carbuncle, cellulitis), than when it is merely incidental. The prognosis of diabetes is, too, far graver in very young adults and in the very old, than in the middle-aged.

If a foot gangrene is dry and limited to one or more toes or even to the tissues just proximal to the toe, the surgeon is justified in treating it "expectantly," but with great care to avoid infection, in anticipation of a spontaneous separation and in the hope of a satisfactory healing. A more extensive gangrene than this requires surgical amputation.

Pronounced cholemia, unless it be acute, makes an operation a hazardous procedure, especially in the aged. In spite of it, operation may be imperative. To minimize its dangers the bleeding and coagulation time should be watched from day to day, blood coagulents should be employed preoperatively and, when the obstruction is due to stones, one may often wait for a subsidence of symptoms, with a much better prospect of a recovery. When the cholemia is due to carcinoma operation should be avoided.

In a diabetic, if gangrene of one or more toes is associated with an apparently mild and very limited infection, and if the urinary and blood findings are not forbidding, the surgeon is not unjustified in treating this conservatively, by free drainage and adequate absorbent dressings, *provided that the patient is under constant observation and that amputation can be performed at any time.* But if a single attempt at drainage does not arrest the progress of the infection, if the cellulitis extends at all, it is dangerous to delay further. Second and third incisions do no good—indeed, they seem to spread the cellulitis—and at any moment during the delay may come the dreaded explosion—acidosis and coma.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

PREPARING FOR MEDICAL-MILITARY SERVICE.

In the development of medical officers for the United States military and naval services it is exceedingly important that promptness in training be secured. A large number of ambulance units have been constituted from men thoroughly willing to serve, but lacking in the essential technical knowledge fitting them for the particular duties connected with military organization. It is probably impossible to prevent the first units who are sent abroad from going unprepared, save in the medical and surgical technic acquired through civil practice. It would appear to be an act of wisdom for ambulance units to become thoroughly organized and to undergo a course of training, fitting them for any type of service to which they may be assigned, either in this country or on foreign soil. Every physician contemplating enlistment in the war should be undergoing a period of training in order to familiarize himself with the numerous problems which are certain to present themselves.

Various medical colleges are now instituting courses of lectures under military auspices to facilitate the didactic instruction of candidates for the medical corps. A general course involves the duties falling upon the medical department during peace or war, including sanitation, supplies, records, examination of recruits, hospital organization, rationing, hygiene on the march, in the camp, and in the field, military weapons and their effects, and the characteristics of wounds from various sources. The numerous diseases, not peculiar to but common among soldiers, are discussed as well as methods of the evacuation of the wounded, the treatment of wounds, and the general tactical information required by medical officers in protecting the health and welfare of troops.

A large number of physicians will undoubtedly find themselves unable to attend upon organized courses of lectures, but, nonetheless, feel the need of self-improvement and development along these lines. In connection with this problem much benefit may be secured through familiarity with the various regulations of the medical department. It may be possible to have access to these manuals, books of rules and tables of organization at army headquarters. It appears to be difficult to secure copies for personal use as the supply is apparently limited. Application must be made to the Government Printing Office, Washington, D. C., and copies will be forthcoming if they are available.

Among books which are purchasable and which are of particular value there may be recommended the following:

Military Hygiene. By Colonel E. L. Munson.

Military Hygiene. By Colonel Valery Havard.

Military Hygiene. By Major P. M. Ashburn.

Military Hygiene. By Colonel A. E. Woodhull.

Field Service. By Captain J. A. Moss.

Medical Service in Campaign. By Colonel Paul F. Straub.

A Study in Troop Leading and Management of Sanitary Service in War. By Morrison and Munson.

Handbook for Sanitary Troops. By Colonel C. E. Mason.

Gun Shot Injuries. By Colonel Louis A. Lagarde.

Surgical Experience in South Africa. By G. H. Makins.

Medical Military Aspects of the European War. By Fauntleroy.

Military Surgery. By Dunlap Penhallow.

The above-named works are merely designed to suggest a starting-point for those aiming to prepare themselves for the service they desire to undertake.

With the exception of work in base hospitals the amount of surgical service performed is comparatively negligible for higher officers compared with the importance of administrative work and effective sanitation and the securing of a high degree of personal hygiene on the part of troops.

During the period of time that must pass before the mobilization of the army by selective draft, the medical forces should be put through a rigorous course of training with a view to developing their efficiency as a unit and developing the potentialities of the personnel. There can be no excuse for failure to develop this important branch of military service and the need for it is apparent to all familiar with the medical aspects of modern warfare. The large number of majors and captains recently commissioned who lack adequate knowledge of their duties is bound to result in unsatisfactory service unless special effort is made to acquaint such officers with the details of their future duties. The fact that a man stands high in the medical or surgical profession and largely on this basis attains high rank does not suffice to prove that he will become an equally great leader in military service. Reputation and name under civil conditions will not serve as a satisfactory substitute for the carefully trained man whose youth and enthusiasm, medical training and hospital experience is supplemented by thorough instruction along military lines. As Lieutenant Colonel Henry Page of the Medical Corps of the Army put it, in the *Military Surgeon,* April, 1917:

"I grant you that surgeons intended only for ward work in base hospitals require far less training than do men required for field service, but this does not alter the fact that a man without military training is a misfit in the military establishment, no matter what duty he attempts. This is true of teamsters, depot clerks, pay clerks, and chaplains, but it is far more true in the case of surgeons who must be made available for so many of the duties of a soldier. So much for the apathy of the medical profession that is born of a lack of appreciation of the necessity for preparedness."

Assuming for the time being that the struggle in which this country is now engaged is to be of long duration, every ounce of effort should be put forth to prepare the medical organization for competent service. The time to begin is now. The call to arms has been issued. The medical profession has a responsibility for self-preparation which it should be the first to recognize.

Are you preparing yourself for service? Are you competent? Are you informed? Are you ready?

Book Reviews

Oral Abscesses. By Kurt H. Thoma, D.M.D., Lecturer on Oral Histology and Pathology and Member of the Research Department of Harvard University Dental School; Instructor in Dental Anatomy, Harvard Medical School; Visiting Dental Surgeon to the Long Island Hospital, Consulting Oral Surgeon to the Boston Dispensary. Octavo; 213 pages; 293 illustrations (several in colors). Boston: Ritter & Company, 1916.

At this time, when so much attention is directed to "focal infections"—especially in the tonsils and teeth—as causes of various diseases often of obscure origin, this comprehensive monograph on Oral Abscesses, written with authority, is a welcome contribution.

It discusses briefly "abscesses" of the tongue, and suppuration of the salivary glands and ducts, but it deals chiefly with dental abscesses. Tonsillar infections are not considered.

Every aspect of dental abscesses is discussed at length—etiology, pathology, histology, bacteriology, roentgenology, remote effects, complications, surgical treatment and preventive dentistry. In addition the author cites several cases of joint disease, septic anemia, etc., in which improvement followed the treatment of tooth abscesses discovered by x-ray examination.

There is free quotation from the literature. Rosenow's teachings are thus referred to and apparently accepted by Thoma.

The book is profusely illustrated with roentgenograms, drawings, photographs and many colored plates. Typographically it is not as attractive as it is pictorially. The same size type is used for headings and for sub-heads, e. g., for "Acute Cervical Lymphadenitis" and for "Illustrative Case." We cannot refrain, also, from criticizing such slang as "the patient had no temperature" and "x-rays were taken."

It has been too often demonstrated to longer dispute that some "rheumatic pains" and other conditions have had their origin in focal infections located beneath a tooth, often discoverable only by x-ray examination. It has not yet been satisfactorily established, however, that such "focal infections" in tooth, tonsil or seminal vesicle, are as often the cause of distal symptoms as many enthusiasts believe. It is well to examine the teeth roentgenographically and to attend to a disease process definitely demonstrated there; but is unwise to become obsessed with "focal infections" and to sacrifice tonsils and teeth on the altar of a fad.

Every physician and surgeon should inform himself thoroughly upon the subject of dental abscesses, so that he can diagnose their presence from the films and understands how, by imperfect dentistry and otherwise, they are produced. We cordially commend this comprehensive monograph for this purpose. It is clear, thorough and very interesting. It does not make too sweeping claims, but it drives the lesson home.

A Practice of Gynecology. By Henry Jellett, M.D. (Dublin University), F.R.C.P.I., Master, Rotunda Hospital, Dublin; formerly King's Professor of Midwifery and Gynecology, Dublin University; Extern Examiner in Midwifery and Gynecology, Dublin University, Royal University of Ireland, and Victoria University, Manchester; Censor and Examiner in Midwifery and Gynecology, Royal College of Physicians, Ireland. Octavo, 618 pages; 385 illustrations. Philadelphia: Lea & Febiger, (1916). (Printed in England.)

The present volume represents the fourth edition of the author's "Short Practice of Gynecology," which has been altered and practically rewritten so that it may be referred to by the specialist in the practice of gynecology. A great many really illuminating illustrations have been added, particularly of operations and of pathological specimens. Two special chapters have been added to bring the work up to the present status of gynecological progress. These are contributed respectively by Walter Stevenson and R. J. Rowlette on "Radiotherapy in Gynecology" and "Vaccine Treatment in Gynecology."

In spite of the personal difficulties entailed by war-work, Jellett has succeeded admirably in enlarging and improving upon the third edition of his "Practice of Gynecology" and enhancing in no small measure the practical value of the book. His exposition of the majority of the more theoretical aspects of the subject is further to be specially commended for its clearness and accuracy and its agreement with the most recent developments in gynecologic literature.

Clinical and Laboratory Technic. By H. L. McNeil, A. B., M. D., Adjunct Professor of Medicine and Instructor in Physical Diagnosis, University of Texas Medical School, Galveston, Texas. Duodecimo; 88 pages, illustrated. St. Louis: C. V. Mosby Company, 1916.

In this book the science of physical and laboratory examination is reduced to the barest outlines. Only methods are given, without their significance. The bareness of the text necessarily renders the book of very limited value, but we can conceive that it may prove of some service as a handy reference book in laboratories. There is one very important omission. Blood cultures, except in the diagnosis of typhoid fever, are not discussed.

Progressive Medicine. Edited by H. A. Hare, M. D., assisted by L. F. Appleman, M. D., March 1, 1917, octavo; 319 pages. Philadelphia and New York: Lea and Febiger.

This volume contains the following articles: Surgery of the Head and Neck, by Chas. H. Frazier, Surgery of the Thorax, by George P. Müller; Infectious Diseases, by John Rührah; Diseases of Children by Floyd M. Crandall, and Rhinology, Saryngology and Otology by George M. Coates. All the reviews are of the high order of merit usual with this publication.

Practical Uranalysis. By B. C. R. Williams, M. D., Director, Wabash Valley Research Laboratory; Author of *"Laboratory Methods,"* etc. Duodecimo; 142 pages; illustrated. St. Louis: C. V. Masby Company, 1916.

This is a very practical working text-book on uranalysis. As a rule, only the standard methods of examination are given, so that the reader is not confused by a multiplicity of methods. The rationale and description of the methods are clearly set forth, and the significance of the findings are discussed in a single and concise manner. Differences may arise in some instances in regard to the best method selected for a given analysis, but in such instances, we must respect the author's experience. Indeed, much of the value of the book is due to the fact that it is largely a personal work. Many will probably differ with the author in regard to the interpretation and significance of renal cells in the sediment. On the whole, however, the book has a distinct value.

The Internal Secretions, Their Physiology and Application to Pathology. By E. Gley, Member of the Academy of Medicine of Paris; Professor of Physiology in the College of France, etc. Translated from the French and Edited by Maurice Fishberg, Clinical Professor of Medicine, New York University and Bellevue Hospital Medical College; Attending Physician, Montifiore Home and Hospital for Chronic Diseases. Duodecimo; 241 pages. New York: Paul B. Hocher, 1917.

This volume attempts to present in a brief and clear manner a discussion of the physiology and pathological significance of the endocrine glands. The author indicates that physiologists long knew much about the secretions of the duct glands, but that the study of endocrine secretions still requires much investigation. The endocrine secretions are those which come from glands which distribute their products not through the cutaneous surface or the gastro-intestinal mucous membranes, but directly to the tissue by means of the blood stream.

In chapter II there is a very good presentation of the rôle hormones play. Gley first states facts and then proceeds to make his deductions. On pages 172 to 174, inclusive, there are compact tables showing the products secreted by the internal glands, the resultant disorders which follow upon changes in these organs, and the functional correlation depending upon the endocrine products secreted.

The final chapter considers the functions of the internal secretory glands. The normal activities of the glands are given, then the facinating interrelationship between these glands discussed so that the entire subject seems related and consistent.

This volume, although small and unpretentious, is nevertheless valuable. It is written by an authority and accomplishes what it attempts to do, namely, to bring before the medical reader a timely and clear exposition of the functions and importance of the endocrine glands.

Books Received

How to Run an Automobile. A concise, practical treatise, written in simple language explaining the functions of modern gasoline Automobile parts with complete instructions for driving and care. By Victor W. Page, *M. E.*, member Society of Automobile Engineers; Author of "The Modern Gasoline Automobile," "Automobile Repairing Made Easy," &c., Duodecimo; 178 pages; 72 illustrations. New York. The Norman W. Henley Publishing Co., 1917. $1.00.

Physical Chemistry of Vital Phenomena. B. J. F. McClendon, Assistant Professor of Physiology in the University of Minnesota. Small octavo; 240 pages; illustrated. Princeton: Princeton University Press, 1917. $2.00.

Cancer. Its Cause and Treatment. By L. Duncan Bulkley, A.M., M.D., Senior Physician to the New York Skin and Cancer Hospital, etc. Volume II. Duodecimo; 282 pages. New York: Paul B. Hoeber, 1917. $1.50.

A Surgeon in Khaki. By Arthur Anderson Martin, M.D., Ch.B., F.R.C.S.Ed., Senior Surgeon, Palmerston North Hospital, New Zealand; late Field Ambulance, 5th Division, 2nd Army: late Surgical Specialist, No. 6 General Hospital, Rouen, France, British Expeditionary Force; late Civil Surgeon, South African Field Force, 1901. Duodecimo; 216 pages; illustrated. New York: Longmans, Green & Co., $1.00.

Pulmonary Tuberculosis. By Edward O. Otis, M.D., Professor of Pulmonary Diseases & Climatology, Tufts College Medical School, Boston; formerly Visiting and Consulting Physician to the Massachusetts State Sanatorium (Rutland); Consulting Physician to the Boston Dispensary, Tuberculosis Department. Small octavo; 220 pages; illustrated. Boston, W. M. Leonard, 1917.

Quiz Compend on Physiology. By Albert P. Brubaker, A.M., M.D., author of "A Text-Book of Physiology;" Professor of Physiology and Medical Jurisprudence in the Jefferson Medical College; formerly Professor of Physiology in the Pennsylvania College of Dental Surgery; Fellow of the College of Physicians of Philadelphia. *Fourteenth Edition.*. Duodecimo; 262 pages; 26 illustrations. Philadelphia: P. Blakiston's Son & Co., 1917. $1.25.

Fractures and Dislocations. By Lewis A. Stimson, B.A., M.D., LL.D., Professor of Surgery in Cornell University Medical College, New York; Consulting Surgeon to New York and Bellevue Hospitals; Corresponding Member of the Sociétié de Chirurgie of Paris. *Eighth Edition.* Octavo; 946 pages; 514 illustrations. New York & Philadelphia: Lea & Febiger, 1917. $6.

Progress in Surgery

A Résumé of Recent Literature.

Fascia Transplantation Into Visceral Defects: An **Experimental and Clinical Study.** Harold Neuhof, *Surgery, Gynecology and Obstetrics*, April, 1917.

The free transplantation of fascia into asceptic fields has a wide sphere of usefulness. It has proved very satisfactory in the replacement of thoracic defects, of aponeurotic defects in operations for various types of hernia, and of defects of the cranial dura. Fascia transplants have been very successfully used, in a variety of ways, for the reinforcement or replacement of ligaments, tendons, and paralyzed muscles. They have proved effective as coverings for wounds of solid organs, especially the liver. Their usefulness has not been clearly demonstrated in other asceptic fields; as sheaths for the isolation of nerves, as strips for occlusion of the pylorus, in fixation or suspension of organs, for separation of joint-surfaces.

There are many advantages of fascia over other tissue transplants (fat, muscle, periosteum, etc.) for the purposes mentioned. Fascia (lata) is most readily accessible, is obtainable in almost unlimited quantities, its removal does no damage. Transplanted fascia has a remarkable tendency to heal in place even under most disadvantageous conditions, requiring minimal nourishment to obviate necrosis. It combines great tensile strength with slight tendency to stretch or contract. It is most readily adaptable to the shape of any organ, and technically can be most easily handled. Finally, fascia can be invariably transplanted autoplastically. The other transplantable tissues have some of these characteristics, none of them has all. The ultimate fate of transplanted fascia has not been definitely determined. The experiments Neuhof has reported indicate early disintegration in non-aseptic fields, degeneration at late periods in asceptic fields. Of practical importance is the fact that the resultant firm connective tissue is as serviceable as the original transplant.

In the presence of infection, or about hollow viscera fascia transplants have been equally successful and unsuccessful. In the former the author considers the successful grafts to have been fortunate accidents.

Bladder defects were successfully replaced by fascia. As much as half the bladder could be so replaced. The fascial grafts were sutured into and not over the defects. Bone formation was an invariable sequel at the site of the graft, but is not necessarily due to the fusion, as the same result followed when fat was used to fill in the defect. The immediate anatomic and functional results of replacement of extensive ureteral defects by tubes of fascia were satisfactory.

Large tracheal defects (involving as much as three cartilage rings and most of the anterin aspect of the organ) were invariably replaced successfully. The anatomic result was ideal, cilated tracheal epithelium growing completely over the transplant soon after the operation. The functional results were satisfactory, the newly formed tracheal wall being rigid and resistant, the narrowing of the lumen being insignificant.

Large esophageal defects were replaced successfully in all experiments. Slight stenoris developed soon after transplantation; at later stages this was almost imperceptible. Epithelial overgrowth was complete. The functional was as good as the anatomic result.

Perforation through the transplant invariably followed its simple implantation into gastric defects. When gastroenterostomy, with or without pyloric exclusion, was added the graft of fascia healed smoothly over.

In the intestine fascia transplants succeeded most often in the large intestine, less often in the lower part of the small intestine, and least of all in the upper part of the small intestine.

Finally transplants of fascia were successful in other than hollow viscera; in the liver, diaphragm, pleura, lung, pericardium, sninal dura.

In addition to the experimental details of this enormous amount of work, Neuhof gives the clinical aspects of the experiments. He concludes his study with the report of a successful replacement by fascia of a large urethral defect; also that of a successful replacement of a tracheal defect in the same way.

A long bibliography concludes this truly monographic contribution to the subject of fascia transplants. The results obtained by Neuhof and the many suggestions for further work cannot fail of being a great stimulus in the development of this difficult and much neglected field of plastic surgery.

The Effect of Removal of the Gall-Bladder, an Experimental Study.

E. STARR JUDD and FRANK C. MANN, *Surgery, Gynecology and Obstetrics,* April, 1917.

After the removal of the gall bladder, Judd and Mann found that all the ducts outside the liver dilate. The sphincter at the entrance of the common bile-duct into the duodenum is the chief factor in producing this dilatation. After cholecystectomy, this sphincter can withstand only a small percentage of the pressure which it normally maintains. When all the muscle fibres are dissected free from the intramural portion of the duct, the biliary tract does not dilate after the removal of the gall bladder.

Local Analgesia in the Cure of Abdominal Hernia.

J. H. JACOBSON, *Interstate Medical Journal,* March, 1917.

Jacobson believes that the surgeon will return to a greater and wider use of local analgesia for herniotomy. There is a choice between the Schleich and the "Braun" methods. In the former the operator uses small hypodermic needles and each layer of tissue is infiltrated before it is incised; the quantity of anesthetic solution is quite small. In the Braun method larger amounts of solution are used through large needles. The entire zone of operation becomes circumscribed by a ring of anesthesia. This method is sometimes known as the "conduction" method of anesthesia.

Novocain freshly prepared and boiled for three minutes is generally employed; the strength varies from ½% to 2% solution. A preliminary general narcotic is not given. Under novocain infiltration the author has performed many hernia operations with much ease. The operation is complete, there is no pain, and there are no post anesthesia effects such as one may get after the use of general anesthesia.

Tuberculous Hip Disease.

JACOB GROSSMAN. *Medicine and Surgery,* March, 1917.

After the spine, the hip joint ranks as the most frequent joint for tuberculosis involvement. The process is always destructive and consequently leads to impairment of joint tissues and resultant physical and mechanical changes. The disease is practically one of childhood, before 10 years as a rule. The focal lesion (and the initial one) is in the bone or original membrane, but soon the disease extends and with it there appears a distinct inflammatory atrophy.

Incipient tuberculosis of the hip is extremely difficult to diagnose since any irritative or inflammatory condition may simulate the same clinical picture. The *x*-ray is not of great value in these early cases. Later the roentgen ray is of help in diagnosing the condition and in tracing the course of the disease.

To obtain a recovery with a well functioning joint it is very necessary to arrive at an early diagnosis. Local orthopedic measures are not sufficient; they must be used with hygienic and constitutional treatment. Tuberculin and heliotherapy may be employed as adjuncts.

A Satisfactory Method of Obtaining Blood for Diagnostic Purposes in Infancy, with a Preliminary Report on Longitudinal Sinus Transfusion.

EARL MENDUM TARR. *The Canadian Medical Association Journal,* March, 1917.

The author has carried out 207 intravenous punctures into the longitudinal sinus of children. The finger is placed at the lowermost point of the posterior fontavelle and the sinus entered just above the finger. Blood flows very readily. This method is available for children, however small or debilitated they may be. For obtaining blood or for venotherapy of one form or another, this procedure is safe, convenient and simple.

Tarr performed a blood transfusion through the longitudinal sinus and speaks very highly of the availability of the sinus for all such occasions.

Results of Treatments for Fractures of the Carpal Bones.

H. W. MARSHALL, *Boston Medical and Surgical Journal.* March 1, 1917.

From a study of eighty-one cases, Marshall draws the following conclusions:

The very large majority of injuries to carpal bones are fractures of the scaphoid.

1. Early fractures of scaphoid bones without displacement of fragments should be protected for a short time,—one to four weeks,—then passive and active movements gradually resumed until painful symptoms subside. Such early fractures resulting from slight injuries should not be operated on, because many wrists regain good function with very little medical care.

2. Old ununited fractures of scaphoid bones, without displacement of fragments, however, should be operated upon if soreness persists for a long period, or recurs frequently enough to cause serious disability.

3. Occupational elements are important ones in determining subsequent disabilities. Workmen whose occupations compel constant severe use of their wrists will be incapacitated for longer periods than those whose work requires only intermittent light use of wrists, other factors of the situations being equal.

4. The length of time which should be allowed to elapse between injury and time of operation differs widely according to different occupations, different degrees of initial injuries, and varying constitutional conditions of patients. Decisions as to surgical intervention should be made by comparisons of the existing degrees of incapacity with probable results of surgical treatment and its attendant sequelæ in form of repair from surgical trauma and the disturbing of normal bony relations of the wrists.

5. Fractures with accompanying irreducible dislocations of semilunar bones should be operated upon soon.
6. Perfect restorations of wrist motions after operations appear to be rare, but fairly serviceable wrists ultimately should be expected.
7. Protecting wristlets are useful for patients who are in intermediate stages, or for brief recurrences of symptoms in old cases, if supports are made removable so as to be used to regulate more accurately changing proportions of exercise and rest which have to be made in restorations of normal functions. Wristlets can be employed easily, however, in a way to furnish too much protection, and thus prolong recovery unduly.
8. Fractures of other carpal bones, so far as is known, act similarly to scaphoid fractures, and painless useful wrists presumably are ultimate results in all cases; but too few cases are included in the present series to draw conclusions from.

Hypertrophic Ileo-Cecal Tuberculosis.

H. GAGE and E. L. HUNT, Boston, *Boston Medical and Surgical Journal,* February 22, 1917.

Gage and Hunt give a general survey of the subject. Ileo-cecal tuberculosis is not very common, although, since 1891, when attention was called to the condition, upwards of three hundred cases have been reported. Pathalogically, the condition is distinguished by a tubercular invasion starting from the mucosa with an immense fibroid change in the walls of the intestine so that the organ is considerably increased in thickness. Clinically, the disease resembles cancer very closely; indeed in most instances the differential diagnosis is impossible. Unlike the Entero-peritoneal type of tuberculosis, cecal tuberculosis is rarely accompanied by other active foci of the disease, so that the probability is very strong that this form is a primary focus resulting from infection by way of the intestine. The authors favor resection as the best method of treating the disease, and not by ileo-colostomy.

Lightning—Some of Its Effects.

CASPAR FRANK HEGNER. *Annals of Surgery.* April, 1917.

Hegner points out that protection against lightning does not lie in providing insulation or resistance, but in establishing a path of greater conductivity and of less resistance than the body. He compiles many interesting and instructive facts and emphasizes particularly that the amount of damage to the clothing or to the surface of the body is no index to the extent or the severity of the injuries sustained within the body.

As lightning travels faster than sensory impulses or the tracts are blocked, the injuries at the time of their occurrence are usually painless. The symptoms may be grouped as (1) external, mechanical, (2) internal or essential, (3) mental or psychical.

The prognosis is always guarded. Symptoms are temporary as a rule if no demonstrable pathological conditions result from the stroke.

Supernumerary Bones of the Foot.

SAMUEL KLEINBERG, *Annals of Surgery.* April, 1917.

The author has observed with comparative frequency in the routine x-ray examination of feet, supernumerary bones and also well-marked variations in the outlines of the astragolus and oscalcis. It is important to diagnose the presence of these supernumerary bones as something distinct and different from fractures or inflammatory processes.

Three hundred and fifty x-ray plates were made (of one or both feet), and of tris number 62 showed supernumerary bones. Kleinberg, therefore, says that these bones are frequently found in the foot. They are constant in position and regular in outline, though they may vary in size and shape.

Isolated Disease of the Scaphoid Bone of the Foot (Köhler's Disease).

W. B. HETZEL, *The American Journal of Orthopedic Surgery,* March, 1917.

Hetzel adds another case to the twelve already reported. The condition as reported by Köhler deals with isolated changes of the scaphoid only. The bone remains smaller than normal, irregular in outline, with no distinction between cortex and spongy position. These signs are readily made out by the x-ray and are quite typical.

Clinically the patient complains of slight pain on weight-bearing and there is limping. The diagnosis is not difficult and once arrived at the condition yields to treatment of immobilization.

In all likelihood this disease is due to an osteochondritis of the scaphoid bone.

Preliminary Renal Drainage with Special Reference to the Two-Stage Operation on the Kidney.

JOHN R. CAULK, *Annals of Surgery,* May, 1917.

For a limited group of cases, Caulk advises a two-stage operation for kidney surgery. In children and in infants particularly who reach the surgeon with large pyonephroses, for instance, extremely toxic and where any surgical shock would be fatal, a preliminary nephrotomy may offer the only chance for a recovery. Caulk has operated upon quite a number of such children without any fatality. Under gas anesthesia the kidneys are exposed through a lumbar incision, tube drains inserted within and about the kidney, and the patient removed from the operating room. About four weeks later the kidney is removed.

The two-stage operation is of special value in bilateral calculus, pyelonephritis or pyonephrosis. At the first step, one kidney is drained and subsequently the stones removed on that side. The procedure is repeated for the opposite side.

The Value of the Bacillus Bulgaricus in the Treatment of Coccus Infections of the Bladder.

RICHARD FROTHINGHAM O'NEIL. *Annals of Surgery,* May, 1917.

In 1914, Caulk reported striking results obtained in the treatment of incrusted cystitis with an emulsion of bacillus Bulgaricus. O'Neil carried out this procedure and found it to be of distinct value. At first, he employed the tablet preparations of the bacillus Bulgaricus, but subsequently found fresh liquid cultures more reliable. The technic consists in injecting 20 cc. into the bladder after a preliminary irrigation. The treatment is given daily and acid sodium phosphate is administered at the same time.

From an analysis of his cases, O'Neil states: (1) that crustations which occur in coccus infections with an alkaline urine can be best removed by the injection of these bacteria. (2) The reoccurrence of these incrustations may be prevented by maintaining a strongly acid urine, by means of these bacteria. (3) The method is applicable in the treatment and prevention of incrustations sometimes seen in urinary wounds. The treatment must be regular and produces no untoward effects. If the infection is not confined to the bladder, the treatment is of little permanent value.

Results of Local Anesthesia for Prostatectomy. (Résultats de l'anesthésie locale de la Prostatectomie).

F. LEGUEN. *Journal D'Urologie,* 1914-1915, Volume VI, No. 6.

The author reports excellent results with local anesthesia in 150 prostatectomies. The patient receives a preliminary injection of 0.01 centigram morphine and the bladder is filled with 40 to 50 cc. of anesthesia solution, i. e., ½% novocaine solution to which five drops of adrenalin (1:1000) is added for every 100 cc.

The paravesical areas and the space of Retzius are carefully injected, then the bladder wall itself. When the bladder is opened two fingers of the left hand are introduced, facing the pubis to guide long, curved needles through which the prostate is infiltrated in at least five or six places. Enucleation is now simple and carried out with no pain.

About 250 to 300 cc. of solution are required. There are no immediate or remote effects.

The United States has joined the world war for democracy! YOUR help is needed.

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NOTES ON CERTAIN POST-OPERATIVE COMPLICATIONS AND SEQUELÆ. *

Thrombo-phlebitis: Parotitis: Paralytic Intestinal Distension.

GEORGE S. COON, M. D., F. A. C. S.,
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It is not intended in this paper to discuss all the complications and sequalæ that may accompany or follow celiotomy, my principal object being to report with commentaries a few cases which have recently come under my personal observation, including thrombo-phlebitis and phlebectasia involving the lower extremities, bilateral parotitis, and paralytic intestinal distension, the so-called paralytic ileus.

Thrombosis and embolism may involve arteries or veins in any situation. Where venous inflammation also exists the lesion is designated as thrombo-phlebitis; where venous enlargement and dilatation occur the term phlebectasia is applicable; where pain is a concomitant it may be properly called phlebalgia. While the following sequence of events has oftentimes been clinically observed; (a) phlebitis, (b) thrombosis, (c) embolism, extensive phlebitis may exist without the production of either thrombi or emboli, and *vice versa*.

So far as can be ascertained Hunter (1793) first attempted elucidation of the etiology of thrombus development, advancing the theory that blood changes were responsible therefor. Since that remote period etiological hypotheses have become almost as numerous as there have been writers upon the subject.** Infection as a causative factor, upon which considerable emphasis has been placed during recent years, was first mentioned by Welch (1899); and while in his post-mortem investigations Kratz never failed to find an associated infection in embolism of the pulmonary arteries, experience has demonstrated that post-operative thrombosis and embolism may occur in the absence of infection, as shown in four of the cases herein recorded.

Strange as the observation may appear, experimental thrombosis has seldom been produced even where infective material was introduced into the circulation of the animal. According to Baumgarten, McLean, and other investigators, single or even multiple venous ligation will not produce thrombosis, nor will crushing the veins, the introduction of threads, etc., in the absence of infection. McLean cites an instance where he liberated an infected thread (colon bacillus) in the circulation experimentally; the animal died within four days; necropsy showed seropurulent fluid in the pleural cavity, and the embolus (thread surrounded by blood clot) was found in the right lung. Based upon numerous experiments the author concludes that, (a) endothelial damage, upon which so much stress is usually placed, is not *per se* a cause of thrombosis, that (b) infection and necrosis or the toxins derived from infectious and necrotic processes are probably the most important factors in the production of thrombi, that (c) slowing of the blood stream is a contributory cause, but *per se* will not cause a thrombus to form.

The classification of thrombosis, as given by Hektoen several years ago, seems reasonable:

(1) Thrombosis from adhesion: (a) on foreign bodies, (b) on the inner surface of vessels, the site of necrosis, fatty degeneration, or inflammation;

(2) Thrombosis from stagnation: (a) from local disturbances, from ligation, compression, circumscribed dilatation, (b) from general circulatory weakness;

(3) Thrombosis from fermentation: (a) due to destruction of blood corpuscles, (b) due to the introduction of ferments formed outside of the vessels.

THROMBOSIS OF THE EXTREMITIES:

The first case followed simple cholecystotomy for the removal of choleliths in a rather slender young woman. Convalescence progressed satisfactorily until the ninth day, when the patient complained of acute pain in the right leg, and developed a temperature of 101.6°. The limb subsequently swelled to three times its natural size and became tender, especially over the course of the veins. There was no infection of the wound.

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* Clinical Report read before the Louisville Medical Club, of Louisville, Kentucky, December 15, 1916.

** As an illustration it may be interesting to note that in the attempted explanation of the production of post-operative thrombosis and embolism, probable and improbable theories have been advanced by the following observers among a host of others: Virchow, Recklinghausen, Wright-Knapp, Vasquez, Fowler, Johnson, Hektoen, Sonnenburg, Litten, Quimby, Becket, MacKenzie, Cornil, Duncan-Illman, Boise, Schenck, Mayo, Dearborn, Abbott, Pekelhering, Schlatter, Porter-Jackson, Mahler, Singer, Brucke, Duhrsen, Haward, Morley, Krusen, Frankel, Lilenfeld, Miller, Meyer, Gerhardt, Wyder, Schimmelbusch, Osler, Clarke, Krachl, Frazier, Kelly, Schmidt, Cordier, Senn, Hessler, Faber, Lee.

The patient made a satisfactory recovery with the exception of the leg which gave her some trouble for several months because of the continued pain and swelling.

The second case also occurred in a young woman of similar physical type. The operative procedure consisted in the removal of a left cystic ovary, and shortening of the round ligaments to overcome uterine retro-displacement. There were no adhesions, and no infection followed the operation. The wound healed *per primam* and the patient had already been allowed out of bed, when suddenly without any warning her pulse and temperature began to rise, and intense pain developed in the left leg. This was followed a day later by swelling of the leg with tenderness and a "ropy condition" of the veins. After several weeks in bed these symptoms gradually subsided.

The third patient was a fleshy woman of forty-eight, who had suffered for a number of years from menorrhagia and metrorrhagia, due to multiple uterine fibromata, the abdominal tumor extending nearly to the umbilicus. She had also suffered an occasional attack of so-called acute indigestion. Despite more or less constant hemorrhage, her general condition remained good, the pulse being strong and not accelerated.

A supra-vaginal hysterectomy was performed in the usual manner. Intra-abdominal examination disclosed the gall-bladder filled with concretions, which explained the digestive disturbances previously mentioned. The calculi were removed through a right rectus incision, and the gall-bladder was drained. Both wounds healed without the slightest trouble, and convalescence was satisfactory until the tenth day, when the patient complained of chilly sensations accompanied by increase in the pulse rate and rise in the temperature. This was followed by intense pain in her left leg, which later swelled to double its natural size. The superficial veins were tender, and became hard and "knotty." Notwithstanding that the patient was given repeated enemata and laxatives, and it was recorded that evacuations were abundant, fecal impaction developed in the rectum. Whether this was in any way causative of the thrombosis is uncertain, but it may well be considered a possible factor.

Case four was a young woman who had been suffering from acute pelvic distress for about six weeks, and probably from chronic pelvic disease for a much longer period. During the last five weeks there had been considerable uterine hemorrhage, and she had become very pale and anemic. Her pulse was 100 to the minute, compressible, and some fever had been present from time to time. A mass filled the posterior cul-de-sac, and the diagnosis of bilateral pyosalpinx was confirmed by operation. With the exception of some rather dense adhesions requiring separation, no difficulty was encountered in removing the tubes and ovaries, and barring a greatly increased pulse rate the patient left the operating table in excellent condition. Two cigarette drains were inserted to the bottom of the pelvis.

The patient had considerable fever (100° to 102.6°) with a rapid pulse (120 to 140) for nearly a week, and there was a free discharge of pus. She was just beginning to improve, with normal temperature and lessening discharge, when thrombosis with its usual symptoms,—fever, pain and swelling,—developed in the left leg, accompanied by abdominal distress, distension and tenderness. About a week later the right leg became similarly involved, but in a less severe form than the left. The patient finally made a good recovery, but will probably have slightly swollen limbs for some time. This is my first experience with thrombosis of both legs following celiotomy.

In case five the patient was a rather fleshy man who drank freely and excessively. The operation was for the cure of a left inguinal hernia which had been unsuccessfully operated upon twice before. The previous operations had left the tissues in a devitalized condition, and the outlook was not promising for a permanent cure, especially as the patient's occupation required heavy lifting. Therefore, before stitching the fascia a filigree of silver wire was introduced. The wound healed by first intention, and a permanent cure of the hernia resulted.

On the sixteenth day after the operation the patient complained of pain in the left leg, which was followed by great swelling, tenderness and "knotting" of the veins. The leg still remains considerably swollen, but otherwise the patient is well.

While thrombosis is not an infrequent complication or sequel of celiotomy, regardless of the disease for which the procedure is undertaken, it occurs far more frequently after pelvic than after upper abdominal operations. Operations for uterine fibromata furnish the largest proportion of instances, thrombosis occurring in five per cent. of such cases. The left leg is the one predominantly affected. In Cordier's series of two hundred and thirty-two collected cases, the left lower extremity was attacked in two hundred and thirteen, the right alone in eleven, and both in eight. It is more apt to occur in patients who have become debilitated from long illness, or those who have suffered from profuse and prolonged hemorrhage, the corpulent and flabby, and those with infectious lesions. However, it occurs not infrequently and most unexpectedly in so-called aseptic cases, where the patients are in excellent physical condition, and where the operations have been of short duration and rather minor in character. It is worthy of note that in four of the five cases herein cited, there was no apparent infection, and in only one was there marked systematic depletion at the time of operation.

According to Kelly and various other observers, death from thrombosis and embolism has occurred after myomectomy, exploratory celiotomy, ventrofixation for retroflexed and movable uteri, salpingoöophorectomy, hysterectomy, curettement of cancerous cervix, operations upon the vagina, the perineum, etc.

The only prophylactic suggestions are, to avoid rough manipulation, and to change the position of the patient frequently. Dorsal decubitus for long intervals favors stasis in the pelvic veins; massage and frequent movement of the legs will improve circulatory tone and tend to prevent stasis; the left lower extremity should receive especial attention, as it is affected ten times as frequently as the right.

Fortunately thrombo-phlebitis involving the lower extremities is seldom fatal, but it usually leaves the limb in a slightly crippled or abnormal condition. Detachment of the clot (embolism) is the chief danger, and to avoid this the patient must be moved as little as possible after the development of thrombosis, and absolute rest in bed for four or five weeks is necessary. Massage of the limb must be prohibited. The foot should be elevated and the extremity immobilized with sand bags. Hot applications are usually grateful, and are of assistance in relieving the pain.

Little need be said concerning the surgical treatment of moderate post-operative thrombo-phlebitis, since medical management will usually suffice. In the more severe types, however, surgery may sometimes be indicated. The statistics of one Italian clinic (Siena) show eighty-five patients subjected to Madelung's operation (saphenectomy), the results, both immediate and remote, being almost always satisfactory; in fact, it is stated that no special post-operative incidents resulted, and there were only eight recurrences during six months' observation. Simple section of the vein, performed thirty-three times, gave thirty per cent. of recurrences during four to ten years' observation; partial saphenectomy, twenty per cent. recurrences in twenty-one cases during four to eight years observation; and finally Moreschi's operation in eleven cases gave two recurrences during six years' observation. (D'Oria).

It is noteworthy that certain infections, e. g., typhoid fever, appendicitis, influenza, pneumonia, scarlatina, puerperal infection, some types of septicemia and toxemia, or in fact any disease determining alterations in the venous walls through action of microörganisms and their toxins, may induce phlebitis with subsequent thrombosis and secondary production of phlebectasia. In the lower extremities the most frequent site of thrombosis is the common femoral vein. The deep venous circulation being thus obstructed, the superficial network assumes the function of returning all the blood in the limb, the result being dilatation along the course of the saphenous vein. If the obstructing thrombus undergoes canalization, deep venous circulation may be re-established and the collateral dilated veins may return to their normal caliber; but if the thrombus causes permanent occlusion of the deep vessels, the superficial dilatations may also become permanent. (D'Oria). In operating for phlebectasia induced by septic thrombo-phlebitis (typhoid fever, scarlatina, etc.) the germs which earlier invaded the circulatory system and were thus responsible for the phlebitis and thrombosis, might be awakened to greater activity (D'Oria) and a fatality ensue. In such types of phlebectasia Biondi recommends interruption of the main arterial current by resecting (between two ligatures) a small portion of the superficial femoral artery, not disturbing either the superficial or the deep venous circulation. "Arterectomy establishes a circulatory equilibrium by interrupting the current in the main artery of the limb, just as the obliterating thrombus had done in the vein." D'Oria reports two cases of thrombotic phlebectasia of the lower extremities successfully operated upon according to the method of Biondi.

Davis gives as the cause of pulmonary embolism producing sudden death after labor or pelvic operations: (a) pre-existing infection, (b) mechanical violence, (c) altered conditions of the blood serum, (d) lesions of the bloodvessel walls. Crouse concludes that in thrombi and emboli:

(1) We have a complication liable in all surgical work of 1.1 per cent.:

(2) The occurrence of such a frightful accident after even such a simple procedure as ventro-fixation teaches anew the important lesson that the surgeon is never warranted in guaranteeing the recovery of a patient after a seemingly simple operation:

(3) That we should carefully examine the circulatory system of all patients demanding an operation:

(4) That operative intervention in selected thrombo-phlebitic cases of the superficial vessels is a rational treatment:

(5) That there is no one factor that can explain a thrombotic development, for such a complication in either a medical or surgical case is due to many different conditions: (a) vessel wall changes, (b) blood changes, (c) anatomical peculiarities of certain regions, (d) mechanical irritations, and (e) infective conditions of vessels, blood and system:

(6) That there is not much that can be done, but there is no surgical state that needs a better common-sense treatment than thrombi and emboli:

(7) That we are dealing with a condition occurring in the main during convalescence, appearing from the second to the thirty-second day, mean average fourteen days; that it is in the main a complication arising without warning.

During twelve and a quarter years (ending December, 1911) Wilson states that approximately fifty-seven thousand major surgical operations were performed in St. Mary's Hospital (Rochester, Minnesota) with forty-seven fatalities from post-operative embolism. Autopsies were made in forty-one cases, and the clinical diagnoses were quite positive in the remaining six.

Site of Operation.	*Number of Deaths.*
Blood vessels	2
Thyroid	2
Mouth	1
Stomach and duodenum	3
Gall bladder	9
Small intestine	1
Appendix	4
Calon and rectum	5
Hernia	5
Kidney	1
Prostate	4
Uterus, tubes and ovaries	10

It is stated that not a single fatality occurred from embolism in over thirteen hundred breast operations, nor in about four hundred and fifty vaginal hysterectomies. Twenty-six of the patients were males, and twenty-one females; the youngest twenty-five years, the oldest seventy-two. In thirty-six the embolism was pulmonary, in ten cerebral, and in one coronory. Some of the author's conclusions are:

(1) Following operations, particularly on blood vessels, alimentary canal, and genito-urinary organs (both male and female), from one to two per cent. of all cases give more or less distinct clinical evidence of emboli, above seventy per cent. of which are in the lungs:

(2) As nearly as can be observed, from the incomplete and necessarily inaccurate data at hand, about ten per cent. of post-operative emboli that give clinical hymptoms of diagnostic significance cause sudden death:

(3) Where post-mortem examinations are made on cases of fatal post-operative embolism, the source of the emboli can be definitely determined as venous thrombosis in about eighty per cent., as cardiac thrombosis in ten per cent., while ten per cent. are scattering and undeterminable:

(4) Though there must be more or less formation of venous thrombi at the site of every extensive surgical operation, yet it is probable that the long, loosely-formed thrombi from medium sized veins are those chiefly concerned in embolism, and especially in fatal embolism:

(5) When large, loose thrombi are once formed in a resting patient, any unusual exertion or change of position may cause dislocation of large masses which become dangerous emboli.

POST-OPERATIVE BILATERAL PAROTITIS.

According to my observation bilateral parotitis as a post-operative sequel of celiotomy is very infrequent, and only one such case has come under my care. It is stated by Oehler that during eighteen months five instances of parotitis following celiotomy were encountered at the Frieburg clinic, whereas only one such example had been recognized in the previous history of that clinic. All the patients were extremely debilitated from malignant disease, and there were two fatalities.

Dyball proposed the term "celiac parotitis" for this rare complication following abdominal and pelvic surgery. It was suggested by Slocum that as the parotitis resulted not merely from surgical intervention, but from splanchnic manipulation or other obscure interference with visceral function, a still more appropriate designation would be "splanchnic parotitis." It is the experience of the majority of observers that parotitis ranks with embolism and venous thrombosis among the very rarest of the operative sequelæ of abdominal and pelvic surgery.

Dorland mentions three cases, two of which were unilateral and one bilateral; one followed accouchement, the other two developed subsequent to pelvic operations. Three cases are cited by DaCosta. According to Frank only sixteen cases of parotitis following appendicectomy have been recorded in the literature. He adds two cases, both unilateral, one of which terminated fatally. Eleven cases are described by Müller.

Mrs. B., a fleshy woman aged seventy-seven years, had suffered many months from frequently repeated attacks of severe abdominal pain, accompanied by distension and vomiting. She had lost considerably in weight because of her inability to retain food. During an acute attack strong peristaltic action could be seen and felt in the right abdominal area. A diagnosis of chronic obstruction to the fecal outflow, probably carcinomatous in character, was readily made. Operation revealed a carcinoma involving the hepatic flexure of the colon which was firmly attached to the liver and gall bladder. A lateral anastomosis was made between the cecum and the transverse colon, and the obstructive symptoms were immediately relieved.

The abdominal incision healed without trouble, and convalescence progressed in a most satisfactory manner until the fifth day, when the patient developed a temperature of 101° F., and the right parotid gland became swollen, hard and painful.

A few days later a similar condition of the left parotid gland was noted. After a week the pain gradually subsided, although some swelling remained for several weeks.

There is considerable difference of opinion as to the cause of post-operative parotitis. Five separate and distinct theories have been advanced in attempted elucidation of the etiology: (a) pyemic or embolic, (b) heat degeneration, (c) toxin excretion, (d) the sympathetic theory, and (e) infection through the duct of Stenson. The latter hypothesis seems the most plausible, although the so-called ascending infection, i. e., through the ductal lumina against the excretory current, in other anatomic situations is emphatically disputed.

Hanau and Pilliet (1889) first suggested that secondary parotitis might be due to infection from the buccal cavity through Stenson's duct. On microscopic examination of sections of parotid glands secondarily infected they found the ducts choked with debris containing bacteria; that the inflammation invariably began around the duct in the center of each lobule, later extending to its periphery and peri-lobular connective tissue where the blood vessels were situated. From these findings they concluded secondary parotitis could not be embolic in origin, else the inflammation would begin around the vessels; furthermore that the inflammation began simultaneously in the center of many lobules indicated ascending infection. This was further emphasized by bacteriological studies of Girode who found on making cultures from the gland, the orifices of Stenson's ducts and the oral cavity, that the micro-organisms from each were invariably identical.

From clinical observations and animal experimentations Claise and Duplay concluded that secondary infection of the parotid gland would occur only in the presence of certain abnormal predisposing conditions: (a) that microörganisms introduced must be excessive in number and exceedingly virulent, (b) that general vitality of the animal must be previously depressed by starvation or otherwise, (c) that the normal secretion and excretion of the parotid gland must be altered in quality and quantity.

Based upon a thorough study of reported cases, the following conclusions are presented by Frank:

(1) That it is highly probable secondary parotitis is due to ascending infection through the duct of Stenson:

(2) That the onset of parotitis may be prevented: (a) by careful mouth cleansing before and after operation, (b) by having everything used during administration of the anesthetic sterile, (c) by having the anesthetist avoid pressure upon the gland while attempting to elevate the jaws of the patient during anesthesia:

(3) That when swelling does not exhibit any tendency to subside in about four days, it is advisable to not wait for fluctuation as the location of the pus is beneath the dense parotid fascia, therefore free incision and drainage should be early practised.

The usual prophylactic treatment recommended is to keep the teeth and mouth clean to prevent stagnation of the salivary secretion while the patient is maintained on a liquid diet. Chewing gum has been recommended by LeGrand Kerr. Unless suppuration ensues the symptoms ordinarily subside in a short time. It must be remembered that suppurative parotitis represents a serious type of pathology, which requires prompt incision and drainage. Suppuration is said to occur in about forty per cent. of cases of post-operative parotitis.

Müller advocates massage to evacuate the pus from Stenson's duct. If no pus emerges on light pressure over the parotid gland and its outlet, massage is contra-indicated, there being no reason to suspect metastatic parotitis. He cites one instance where the primary lesion was in the scapula; the parotid gland became swollen but no pus could be expressed. Four days later pus emerged, but the patient was then practically moribund from pyemia. In other cases treated with massage the duration of the parotitis was three to eleven days, and no phlegmon developed. In five cases in which massage was not applied, phlegmon developed in two; the process persisted over three weeks in two cases; for eighteen days on the right and fifteen days on the left side in another; in one the trouble subsided within five days under moist heat.

With further reference to the case herein reported: Many in the profession seem inclined to deny elderly individuals the relief which the intelligent application of modern surgical principles will amply afford. How often do we hear the remark: "He is too old for an operation." It has been my experience that elderly people withstand surgical operations remarkably well.

Paralytic Intestinal Distension.

One of the most trying post-operative complications or sequelæ for both the patient and the surgeon is paralytic intestinal distension, or the so-called paralytic ileus, with consequent obstruction to the fecal outflow, vomiting, and other distressing manifestations. Two such cases have recently come under my personal observation.

There has been considerable debate as to the cause of post-operative intestinal distension. In the true paralytic type there is more or less complete paralysis of the muscular coats of the intestine, thus permitting the supervention of tremendous distension; but there is complete inhibition of peristaltic movement. According to the majority of observers the interference with peristalsis is caused by disturbed innervation of the intestinal muscularis, exactly the opposite to mechanical obstruction which is due to physical causes. The vagus nerve innervates the entire small intestine, and irritation of its fibers causes movement throughout the entire intestine, i. e., increases peristalsis; on the contrary, irritation of the splanchnic nerve tends to inhibit movement of the small intestine and at the same time causes anemia of its blood vessels. "The question whether paralytic ileus is caused by a disturbance in the anterior cornual cells and their corresponding sympathetic ganglia giving origin to the fibers of the splanchnic nerves, or whether the disturbance takes place in the sympathetic plexuses of Auerbach, Meisner and Billroth in the intestinal wall, will furnish an interesting and important field of investigation." (McKenna).

Mrs. X., aged forty-two years, a very nervous individual, was operated upon for the removal of a large uterine fibroma. There were no adhesions, and the operation was completed without difficulty. The patient convalesced normally for five days, although in the interim she suffered greatly from "gas pains." Gas and feces were expelled on the second day after an enema had been given.

On the fourth day after the operation abdominal distension was considerable, but the administration of a compound cathartic pill produced an abundant alvine evacuation. Her abdomen still remained soft, pliable, and there was no especial point of tenderness. Vomiting first occurred on the eighth day, after which it was frequent, and the vomitus became dark-brown in color. For several days auscultation only occasionally elicited intestinal "gurgling." Enemata were always effectual in causing the discharge of an abundance of gas and sometimes feces. Castor oil, Epsom salts, and other cathartics were administered without avail. Gastric lavage was practiced twice daily, and various medicated enemata were given several times each day. On the twelfth day croton oil (m. iii) was administered in a bismuth capsule, and at the suggestion of Dr. Bryan opium was given. Twelve hours later vomiting became less persistent and peristalsis gradually increased, but intestinal action remained sluggish for about a week. The operative wound healed without any trouble.

The second case was somewhat similar to the foregoing, excepting that it followed operation for strangulated hernia and appendicectomy. There was some peritoneal infection with colon bacilli, and drainage was used. The patient's temperature reached 102° F. the day after the operation, then gradually subsided and remained below 100° F. The pulse was never rapid. The abdomen became greatly distended, but was always soft and pliable. There was no tenderness, and pain was entirely absent.

Vomiting began about eighteen hours after the operation, and continued at intervals for one week. The vomitus soon became dark-brown in color, and finally decidedly fecaloid in character. Occasionally borborygmus could be detected by auscultation. Medicated enemata always caused a free discharge of gas, and frequently small particles of feces were noted. Cathartics of various kinds, including eserine, appeared valueless. Opium was administered during the seventh day. On the morning of the eighth day the patient's condition was desperate, and a seidlitz powder with croton oil (m. iii) was introduced through the stomach tube following lavage, and turpentine stupes were applied. The patient vomited twice afterward; free defecation occurred during the night, and complete relief of symptoms followed.

Just what part opium and croton oil played in the relief of these two cases I am unable to say. I wish to especially emphasize the necessity for gastric lavage, which I believe to have been a very important factor in saving the lives of these two patients.

In closing a few words may be permitted concerning the surgical treatment of post-operative paralytic intestinal distension where medical management has failed to secure the necessary relief. I have never found it necessary to re-open the abdomen in cases of this kind, but in advanced cases enterostomy would be the most logical procedure. In many instances it might be regarded as a life-saving operation. McKenna mentions two cases of post-operative paralytic ileus successfully treated by secondary operation, viz., incision of an intestinal loop fixed in the abdominal wall for drainage and saline irrigation, the resulting fistula being subsequently closed by resection and lateral anastomosis. He suggests, however, that this procedure is attended with grave danger and should only be undertaken after other means have proven futile. It seems indicated in extreme cases where death seems impending. It is believed, however, that such instances will be found relatively infrequent.

REFERENCES.

Baumgarten: Cited by Funke. Med. Rec., 1911, 79, 673.
Boise: Surgery, Gynecology and Obstet., 1906, iii, 146.
Claise-Duplay: Cited by Frank, Surg. Gyn. and Obstet., l. c.
Coe: Medical News, 1899, July 1st, lxxv, 4.
Cordier: Journal of the A. M. A., 1905, Dec. 9th, xlv, 1792.
Crouse: Surgery, Gynecology and Obstet., 1909, ix, 663.
Davis: Cited by Johnson, l. c.
Dorland: Surgery, Gynecology and Obstet., 1906, ii, 466.
D'Oria: International Jour. of Surg., 1915, xxviii, 369.

Dyball: Cited by Dorland, l. c.
Frank: Surgery, Gynecology and Obstet., 1912, xiv, 469.
Frank: International Jour. of Surgery, 1913, xxvi, 353.
Funke: Medical Record, 1911, 79, 673.
Hanau-Pilliet: Cited by Frank, Surg. Gyn. and Obstet., l. c.
Haward: Cited by Boise, l. c.
Hektoen: American Textbook of Pathology.
Hunter: Cited by Crouse, l. c.
Johnson: Surgery, Gynecology and Obstet., 1906, iii, 110.
Kelsall: American Journal of Surgery, 1916, xxx, 58.
Kelly: Operative Gynecology, ii, 1898.
Kratz: Cited by Funke, l. c.
McKenna: Journal of the A. M. A., 1909, April 17th, lii, 1239.
McKenna: Surgery, Gynecology and Obstet., 1913, xvii, 674.
McLean: Surgery, Gynecology and Obstet., 1915, xx, 457.
Müller: Hospitalstinde, 1915, J. A. M. A., 1915, Nov. 27th. lxv, 1958.
Oehler: Beit. f. klin. Chir., 1912, J. A. M. A., 1912, April 6th, lviii, 1045.
Slocum: Cited by Dorland, l. c.
Welch: Allbutt's System of Medicine, 1899.
Wilson: Annals of Surgery, 1912, 809.

THE VALUE OF EYE MANIFESTATIONS COMPLICATING FRACTURED SKULL.

PRELIMINARY REPORT.

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The association of ocular lesions and visual disturbances with fractures of the skull is important from the viewpoint of diagnosis, prognosis, treatment and forensic medicine. In obscure cases an ocular examination may in certain fractures which tend to recover spontaneously give a very bad prognosis as to vision, while other severe and extensive fractures with a very bad prognosis for life may not lead to serious damage to vision, so that if the patient recovers he may completely regain his vison. In suits for damages, an expert opinion may be required in order to exclude the possibility of the existence before the accident of a unilateral or bilatral eye lesion resulting from luctic disease, nephritis, arterio-sclerosis, etc.

The literature of the subject is neither extensive nor very satisfactory. A number of surgeons have reported on very large series of cases of fractured skull without, however, devoting much space to the eye findings; the latter consisting largely of observations on the pupillary changes. Garach, in a Paris thesis, 1914, collected all the cases he could find in the literature, but his notes of 32 published cases, including personal material, have only a limited value because of the incompleteness of some of them, the absence of *x*-ray findings, the scarcity of autopsy material, and the failure to note end-results.

I have records of seventy-five cases of fractured skull, treated at the Harlem Hospital, which were confirmed by *x*-ray pictures, and by autopsy in fatal cases. In nearly all of these ophthalmoscopic examinations were made. In nineteen, fundus lesions were present. The type of fracture in this material is very largely that known as indirect basal fracture, such as is due to blows or falls on the cranium. Eye lesions have been known to follow simple contusion, but in the interest of simplicity they are not included in this present material. In the great majority of fractures, both base and vertex were involved through irradiation, but in practice such cases are all classified under fractures of the base. Violence may have been suffered in any one of the three fossæ, but naturally fractures into the anterior and middle fossæ are those in which the eyes are most likely to be compromised. It is seldom that fracture involving the posterior fossa radiates into the bony structure in the neighborhood of the visual organs.

It has already been stated that simple contusions of the vertex or head injuries of any kind, outside of fractured base and vertex, are eliminated in this study as causes of eye manifestations. All fractures from bulelt wounds of the skull, producing hemianopsia, all cases of direct violence, direct traumatic paralysis of the extrinsic ocular muscles, and pulsating exophthalmos, are also excluded. Our subject is limited therefore to pupillary changes, and to fundal changes such as venous stasis, papillitis, neuroretinitis, optic atrophy, retinal hemorrhages, and changes in the visual field.

Eye manifestations should be brought in relation with brain injury causing papillitis, hemorrhages—in orbit, optic sheath and vicinity, due to direct trauma, (contre-coup) and actual bone injuries to the orbital wall, optic canal, and vicinity, causing laceration or compression of the optic nerve. A study of Garach's thirty-two cases fails to reveal any such mechanism. In some statistics, the orbital wall is involved in two-thirds of all cases of fractured base. In eighty-six cases of fractured base, collected by Von Hoelder, the orbit was involved in ninety-one per cent. and the optic canal in fifty-three per cent.

Certain conditions may antedate the trauma, and may be confounded with changes due to the injury, or may act as contributory causes by offering an element of predisposition. These include congenital anomalies, chronic inflammatory processes, and high refractive errors. Generally speaking, one must bear in mind that the results of trauma must differ as to whether they act upon a healthy or on an abnormal eye condition. The most important sequelæ of fractured base, such as pupillary inequality, pseudo-papillitis, venous stasis, may all be present within a physiological condition in some subjects.

The eye manifestations following fractured skull may be regarded as due, in a general way, to one or more of the following morbid conditions: cerebral hemorrhages, direct or by contrecoup, laceration of brain tissue, orbital hemorrhages, increased intracranial pressure, and possibly osseous compression or simple severing of the optic nerve. The manifestations may be divided into pupillary and fundal.

Pupillary findings: Normal, unequal, bilateral dilatation, bilateral contraction.

Fundus findings: Mild papillitis, moderate papillitis, retinal hemorrhages, unilateral primary optic atrophy, changes antedating the trauma.

Unlike other observers, I have never observed, during a service at the Harlem Hospital for the past five years, where we average 75 cases of fractured skull annually, a single case of choked disc—that is, an evident elevation of the papilla. This condition requires time for development, and in fatal cases death occurs too early for its manifestation, while in the recovered cases it never occurs.

In the material under consideration, inequality of the pupils (in the recovered cases) was noted three times. This condition in the dilated pupil was associated with absence of the direct and indirect light reaction, while in the other pupil the direct reaction is normal, and the indirect reaction is absent. In the dilated side, in these cases, the fundus remained normal only in the early stage of the condition. One of the cases was associated with an immediate unilateral amblyopia, while the other two were accompanied by an immediate unilateral amaurosis. Such cases are important from a visual and medico-legal standpoint, and possibly also from the point of surgical intervention, provided the *x*-ray establishes the presence of bone displacement; but up to the present time this point has not been verified. Inequality of pupils producing a unilateral traumatic dilatation without any apparent optic nerve involvement may also be present in cases terminating fatally, autopsy in such cases showing cortical hemorrhages, ruptured meningeal artery, lacerated brain tissue, hemorrhage into the sheath of the optic nerve, local subdural basal hemorrhages around the optic canal, local hemorrhages appear into the retro-orbital tissues, hemorrhages in accessory sinuses, and fracture of the skull, but without any bone displacement around the optic canal.

The question arises whether this pupillary dilatation can be explained by the existence of cortical centers for visual motor impulses, such centers having been injured by the bone compression, cerebral hemorrhage, or lacerated brain tissue.

The general and local symptoms of fractured skull are too well known to need recapitulation. Since in many fractures that cause eye manifestations the lesions occur or radiate in close proximity to the eye, we often see subconjunctival swelling, chemosis, hemorrhage into the lid, which are not due to direct violence to the eyebal but rather to direct extension from the retro-orbital hemorrhage.

There is naturally great difficulty in conducting an ophthalmological examination soon after the injury, but pupillary conditions are readily noted. These are frequently normal. As soon as the patient recovers consciousness and ability to orientate himself, his visual acuity may be determined by subjective tests. Cases differ very much in this respect. In one type, the acuteness of vision is at once markedly diminished on one or both sides, even to complete blindness. Thus, after a brief period of coma, the patient may find himself blind in one eye; if an ophthalmoscopic examination can be made at this time, the fundus will probably present nothing unusual. In the type of cases in which unilateral optic atrophy gradually develops, visual disturbances usually appear within a few days to a few weeks after the injury. This condition is not perceived by some patients at first, owing to the fact that the disturbance is unilateral. The amblyopia and the amaurosis are due to interference with the conductivity of impulses affecting directly the visual and pupillary fibers of the optic nerve. Perimetric examinations will eventually show various restrictions of the visual fields.

In another class of cases, there are relatively slight visual disturbances after the injury, which are readily explained by slight fundal alterations. In this class, the damaged vision naturally improves, and there usually results a complete restoration of vision.

Since a very large proportion of cases of fractured base end fatally, we can observe the course of the ocular disturbances only in the relatively mild cases. Generally speaking, those that recover are likely to suffer from temporary or permanent visual disturbances, one of the most conspicuous results being unilateral amaurosis or amblyopia. A papillitis appearing a few days or weeks after the accident might indicate the onset of a meningitis, as we have been able to demonstrate by autopsy in three cases.

As regards vision, the cases which show unequal pupils, with no response to direct or indirect light reaction in the dilated pupil, and accompanied by unilateral optic atrophy, result inevitably in a marked permanent deterioration of the vision. Later, the dilated pupil undergoes a slight secondary contraction. In all other cases, whether or not there are pupillary or fundal changes, there is apparently ultimate restoration of normal vision, the fundus becoming normal.

The only macroscopical autopsy findings in the visual apparatus, as I have been able to determine, consisted of hemorrhages into the sheath of the optic nerve, mainly in the orbital part, subdural hemorrhages in the vicinity of the optic foramen, hemorrhages into the accessory sinuses, fracture in the vicinity of the optic canal, and retro-orbital hemorrhages. In cases of unilateral optic atrophy —all in survivors—we naturally have no anatomical findings, hence we have no absolute data relative to the cause of this lesion. If it could be shown by the *x*-ray that optic atrophy is produced by displacement of bone pressing upon the optic nerve posterior to the entrance of the central retinal vessels, or possibly hematoma of the orbital part of the optic nerve sheath, surgical intervention might be considered as a means of preventing amaurosis. Garach notes the relatively frequent occurrence of hematoma of the sheath of the optic nerve, only to conclude that it plays no rôle in causing unilateral optic atrophy. A microscopic study of tissues of the visual apparatus is now being made and will be reported later.

There were seventy-five cases of fractured skull studied for this report; twenty-four ended fatally. The causes of death in all but three was cerebral hemorrhage, death occurring from a few hours to a few days after the injury. The other three deaths were due to meningitis—two died on the sixth day, and one a month after the fracture occurred.

Pupillary findings in 24 fatal cases.

Normal	6	
Unequal	15	
Dilated	3	24

Light reaction was absent in the majority of cases.

Fundal findings in 24 fatal cases.

Normal	8	
Neuro-retinitis	3	
Mild papillitis (bilateral)	3	
Mild papillitis (uninateral)	1	
Moderate papillitis	1	
Retinal hemorrhages	2	
Chronic chorio-retinitis	1	
No examination	5	24

Pupillary findings in 51 non-fatal cases.

Normal	44	
Unequal	4	
Not noted	3	51

Light reaction was sluggish in the majority of cases.

Fundal findings in 51 non-fatal cases.

Normal	35	
Unilateral primary atrophy	3	
Mild papillitis	6	
Not noted	7	51

CONCLUSIONS.

1. Inequality of the pupils with absence of light reflex is very common in fatal cases of fractured skull, while comparatively rare in the cases that recover.
2. Where there is inequality of the pupils associated with unilateral amblyopia or amaurosis in the diluted papillary eye, one must recognize the subsequent possibility in this eye of a resulting descending primary optic atrophy.
3. Lesions of the fundus are relatively infrequent, especially in the recovered cases.
4. Papillitis usually indicates the presence of a meningitis, an increase in the cerebral pressure, or possibly the result of hemorrhage into the sheath of the optic nerve.
5. Contrary to the usual observations, choked disc was not observed in any of these cases.
6. The presence of a unilateral optic atrophy should lead to the investigation of a possible previous head injury, if all other causes are excluded.
7. In the cases terminating fatally, the pupil was generally dilated on the same side as the corresponding cerebral hemorrhage, without showing any autopsy evidence of bone displacement on the optic nerve.
8. Fundus examination immediately following skull injuries may be helpful from a medico-legal point of view, as it may give evidence of the preexistence of contributory factors.

I wish to express my thanks and appreciation to the attending surgeons of the Harlem Hospital and also to Dr. Charles S. Casassa for their kind interest and assistance in this preliminary study.

Pituitary Extract in Obstetrics.

Pituitary extract should not be used except in the presence of a real, scientific indication, and it is governed by the same conditions as the forceps operation, that is, the head must be engaged, the cervix completely dilated, no mechanical disproportion between the child and maternal parts, etc.—Joseph B. De Lee in *The J. A. M. A.*

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, JULY, 1917.

THE MEDICAL RESERVE CORPS OF THE ARMY.

In our May and June issues we called attention to the pressing need for physicians in the military service of our country and, especially, we urged young physicians who have completed their hospital interneships, to recognize their patriotic duty to enter *at once* the Medical Officers' Reserve Corps of the Army. The need is not in the future, nor in the near future, it is NOW. Thousands of doctors must be trained in the duties of recruiting, camp sanitation, field and base hospital administration and active service with the fighting troops. Twenty thousand medical officers are required. Thus far, in the regular army, the national guard and the medical reserve corps there are less than one-fifth of this number.

Many of the older men have joined the medical reserve and are now on active duty; but the younger men, those under thirty-one and thus within the conscription age, have not come forward in the numbers that they should—and very soon, *must* do.

The lowest commission in the Medical Officers' Reserve Corps or, more properly, the Medical Corps of the United States Reserves, is that of first lieutenant, which carries pay of $2,000 per year. Commissions are open to all American physicians, not over 55 years old, who have had suitable professional training and are physically and morally fit.

We publish in this issue an application form which may be torn out and used in the regular way. Fill this out as indicated, and have it sworn to before a notary public. Furnish also a certificate from your County Clerk or other official of your license to practice medicine, and letters from two citizens attesting to your character. The application, the certificate and the two letters should be submitted by mail or in person to the nearest Medical Reserve Corps Examining Board who will examine you then or notify you when to appear for examination. If you do not know where the Board nearest to you is located write to the Surgeon General of the Army, Washington D. C., for this information.

If you are not already in the military service, if you are physically fit, if your home obligations do not actually forbid it, make known NOW your willingness to meet your share of the great obligation that has fallen upon your profession. —W. M. B.

BRONCHOSCOPIC POSSIBILITIES IN CHRONIC LUNG SUPPURATION.

The introduction of the bronchoscope and the orientation of the tracheo-bronchial tree is, or should be, a matter of simplicity in the hands of the experienced endoscopist. The removal of a smooth, non-impacted foreign body should present no difficulties in the absence of complications. For a long time the field of the bronchoscopit was limited to this.

Recently, with the perfection of the armamentarium and the development of the technique, the therapeutic and diagnostic application of the bronchoscope have broadened considerably. Physicians generally are recognizing that while it must always remain a major procedure and that in the hands of an inexpert operator it is not free from danger, a bronchoscopic examination presents less danger to the patient than the possible consequences of its omission. Diphtheria of the trachea and bronchi has been successfully combated, obstructing membranes have been removed and lives have thus been saved. Malignant new growths, small enough to give good operative results have been discovered long before the symptoms and physical signs would have warranted such a diagnosis.

Perhaps the most important advance—inasmuch as the number of sufferers is the greatest—has been made in the study of chronic suppurative conditions of the lung. The history of these patients is usually that of a cough for a longer or a shorter period, expectoration profuse, and of a foul odor, gradually increasing weakness and finally death. Surgery has offered them their only hope, but the selection of proper cases has been an extremely difficult problem. The localization of the lesion from the physical signs is not exact and even the roentgen-ray offers little more definite help. It will be remembered that the interlobar fissures of the lung are situated obliquely so that, in the roentgenogram the lobes overlap and a lesion on the left side may be in the upper or in the lower lobe while on the right side the presence of the middle lobe makes the localization still more difficult.

Bronchoscopy alone can in many cases differentiate between the surgical and the non-surgical cases. Yankauer, who has studied chronic lung suppuration from the viewpoint of the bronchoscopist, has differentiated several groups of cases. In one group there is a dilatation of the main bronchus with secretion in the dilated space. When this secretion is removed it leaves behind it a clean cavity.' There is no tendency for the secretion to reappear during the examination and there is no secretion coming from the branch bronchi. In another group of cases the main bronchus is not dilated. The secretion is purulent in character and in many cases of a foul penetrating odor. When the secretion is cleaned out of the main bronchus it continuously reappears in drops from the mouths of the branch bronchi. It is in this group of cases that the bronchoscope is of inestimable assistance to the surgeon.

Inasmuch as there is no communication between the branches of the main bronchus in their distal distribution the observer can definitely delimit the lesion by noting from which branch the pus exudes. This tells the surgeon which lobe or lobes he is to attack and time and manipulation are saved after the chest is opened. So important has this examination become that some of the foremost surgeons skilled in thoracic surgery will not operate in these cases without a preliminary bronchoscopy. It is obvious, too, that when the involvement is very extensive surgery will fail of its purposes and the patient is better off without an operation. This is also determined with definiteness by bronchoscopy.

There is another group of cases with lung suppuration that come to the bronchoscopist's hands. These are the foreign body cases where there is no history of the inhalation of a foreign body. In all patients with lung suppuration a roentgen ray picture is, of course, made as part of the diagnostic routine. In some of them an entirely unsuspected foreign body is revealed. In others, owing to the nature of the foreign body, it does not show on the plate and is found only at the bronchoscopy. When of long standing these cases present the same clinical picture as the other groups. After the foreign bodies have been removed the condition often clears up miraculously.

In non-operative cases the bronchoscope offers a method of treatment whereby the symptoms can be ameliorated and the patient's life prolonged. The bronchoscope is passed frequently at short intervals and the lung is irrigated through a double current irrigating tube which has been devised by Yankauer. Through one branch of the tube the solution is introduced and through the other it is aspirated from the bronchus. The end of the tube can be directed against the bronchial wall and the pus and mucus washed away. It would seem that these patients, who have become accustomed to having large quantities of secretion in their bronchi are more tolerant of this treatment than one would consider possible. After a few bronchoscopies the patients no longer object to the manipulation. Their general health improves and the secretion becomes progressively less in amount and loses its foul odor.—L. G. K.

PROSTATIC OBSTRUCTION.

There is no nicer problem in surgery than that of the management of urinary obstruction by adenoma of the prostate for it involves, indeed, a nice balance of physical signs and clinical judgment with the laboratory determinations of kidney function, the value and importance of which we have recently learned to appreciate.

In most cases of prostatic obstruction a silver or block tin catheter can be passed, with gentleness, even when mercier and bi-coudé catheters fail. If physicians would learn the wisdom of using the metal catheter at once in these cases it would save much traumatism, bleeding and even infection from futile efforts with other instruments.

If the bladder is much distended it should not be emptied at once lest this produce serious vesical hemorrhage. If the viscus is continuously drained through a catheter for a few days the prostatic obstruction may be so much reduced that thereafter catheterization will be easy or, for a time, may be unnecessary. In some cases of prostatic obstruction the local condition (e. g., inoperable prostatic carcinoma), or the patient's general condition, may make it desirable to continue catheterization for a time or indefinitely.

Usually, however, catheterization will sooner or later cause a purulent cystitis, and the infection may involve the kidneys. Very frequently, too, and sometimes very soon, the passage of the catheter becomes impossible or, at any rate, causes too much distress to be continued. Then suprapubic cystotomy is indicated, preferably under local anesthesia. Such a suprapubic outlet will have to remain indefinitely in those cases in which the patient's condition does not improve sufficiently to warrant prostatectomy. It is a familiar experience, however, that continued suprapubic drainage, by relief of "back pressure" and by obviating the physical and mental distress of tenesmus and of instrumentation, so improves kidney function and general status that, if he bide his time, the surgeon may safely remove the prostate of an old man upon whom, at the outset, such an operation would have been fatal.—W. M. B.

NEURO-PSYCHIATRIC UNITS FOR ARMY HOSPITALS.

The National Committee for Mental Hygiene has created a subcommittee on furnishing hospital units for nervous and mental disorders to the United States Government, the project having been approved by Surgeon General W. C. Gorgas of the U. S. Army.

This subcommittee, of which Dr. Pearce Bailey of New York is chairman, is authorized to secure the services of alienists and neurologists to be commissioned in the Officers' Reserve Corps, Medical Section, and to serve in the neuro-psychiatric units which are to be attached to the base and other hospitals of the military services of the United States. Further information will be given, and application forms sent to physicians qualified in this branch of medicine, on application by letter or in person to The National Committee for Mental Hygiene, 50 Union Square, New York City.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

OCCUPATIONAL MORTALITY STATISTICS.

The relation of occupation to illness and mortality is reciprocal. A high morbidity or mortality rate in any specific occupation necessarily lowers the potential efficiency of industry. A high hazard rate results in a decrease in the economic worth of the individuals entering into it and undermines their vitality.

Thus far complete statistics dealing with these two phases of the same problem are not available. The growing interest in the subject, however, has been responsible for the publication of many studies casting new light upon the importance of occupation as a factor in increasing the morbidity and mortality rates in communities, partcularly those boasting of their industrial prominence.

In *Public Health Reports*, June 8, 1916, Wynne and Guilfoy discuss occupation and mortality on the basis of the mortality returns from the city of New York for 1914. They recognize the numerous difficulties surrounding the correct interpretation of morbidity figures as at present constituted. Appreciating that their findings merely reflect gross conditions in occupations does not deny their value in pointing out the occupations apparently causative of abnormally high mortality rates as a result of the prevalence of undue numbers of specific maladies.

It is in consonance with modern views to find that the mortality from respiratory diseases is highest in those occupations where room crowding and poor ventilation are most common. This is exemplified by the hightened respiratory mortality of clerks, bookkeepers, clerical assistants, compositors and printers.

The fact that the mortality from cancer is uniformly higher in the sedentary occupations as compared with the occupations requiring great effort and endurance suggests the need of further investigation along these lines because the age variations of the workers do not suffice to explain the phenomena upon grounds ordinarily accepted.

Accidents caused five percent. of the total number of deaths recorded among persons over fifteen engaged in the various occupations. The lower the age group the higher the mortality from accidents. The liability to accidents was greatest where the mortality was highest. In other words the hazard of occupation possesses an index in the accident rate. From the standpoint of occupational disease this would scarcely be true. Naturally, therefore, the highest mortality was found among railway, track, and yard workers and the next highest among laborers, while blacksmiths, machinists, painters, paper hangers, and teamsters revealed accident rates higher than the average of all industries.

The statistics of a single year cannot serve as the basis of judgment as to the actual relations existing between industry and accidents or illnesses. A single catastrophe in any one year or a breakdown in the hygienic precautions of an industrial plant may result in an unusually high figure. Similarly strikes, lockouts, or depressed commercial conditions, may result in running industrial institutions at slow speed and with a limited number of workers thus lowering all figures.

From the standpoint of accuracy it is advisable to have the ratio of morbidity and accident reduced to terms of a hundred or a thousand workers per eight or ten hour day. By so doing the curves present greater accuracy.

It is recognized that many items beside the hazard of occupation must necessarily enter into the preparation of statistical tables of this character although it is exceedingly difficult to secure accurate data. The relation of wages, housing conditions, home environment, mental attitude, personal habits, degree of education, and technical training constitute important elements affecting the welfare of industrial workers. On the other hand, it is probable that these conditions do not vary greatly in estimating the general welfare of large numbers of persons and the general average may be accepted as balanced in the consiedration of the actual morbidity returns. Undoubtedly these facts are of still greater importance in connection with the mortality figures. The lower the wages the greater the liklihood of the hospital care. Hours of labor and the length of the working day, incidence of a day of rest are likewise paramount factors in determining the relation of occupation to morbidity or mortality inasmuch as they involve the serious problem of industrial fatigue. The diseases and accidents that result from overwork and overstrain should not be credited to the inherent hazards of the industry, but should be properly attributed to the failure to recognize the vulnerability of the human organism to irrational and unhygienic hours of employment.

These comments and many others which might be made do not vitiate the worth of investigations of industry as suggestions for further studies and as a means of pointing out administrative measures which may tend to lower, limit, or control the all too great morbidity and mortality of occupation.

Book Reviews

Constipation, Obstipation and Intestinal Stasis. By Samuel Goodwin Gant, M.D., LL.D., Professor of Diseases of the Colon, Sigmoid Flexure, Rectum, and Anus in the New York Post-Graduate Medical School and Hospital. *Second edition*. Octavo: 584 pages: 259 illustrations. Philadelphia and London: W. B. Saunders Company, 1916. Cloth, $6.00, net.

In this, its second edition, Gant has thoroughly revised his work on Constipation and Intestinal Stasis and brought it up to date, and has introduced seven new and interesting chapters.

The work is an important one and equally valuable to the surgeon and the general practitioner. It is well conceived and profusely illustrated. The chapters are short and well planned. Gant makes the subject of constipation an exceedingly interesting one by his lucid discussions.

The chapters on anatomy and physiology lack no essential details, and they present a clear conception of what constitutes constipation. The chapter on etiology presents many novel facts generally unknown to the profession. The subject is treated in a broad manner. One learns that constipation is more common in America than in any other country in the world. The differences between atonic and spastic constipation are clearly defined. Gant's opinion that most cases of constipation are of the spastic type and that pure atonic constipation is unusual, is now the accepted opinion of most authorities on the subject. The author does not forget his viewpoint, to ascribe all ills to constipation. He definitely and moderately states that a condition of stasis may be coincident with many complaints and symptoms such as those of a general neurosis or neurasthenia, and yet not be the cause thereof.

The subject of therapy is adequately developed. The mechanical and hydrotherapeutic adjuvants to treatment are described in all detail. The rôle of psychotherapy and Christian Science in the cure of constipation is not overlooked and is graciously conceded. Copious water drinking is warmly recommended among other measures.

The chapters on the surgical treatment of mechanical constipation are well written and extensive. He urges the removal of tumors of the large bowel in two stages.

Excellent statistics are quoted from the literature and the author draws upon his wide personal experience for further data. Drainage of the excluded portion of the large intestine, such as accompanies excision of a portion of the bowel for disease or abnormal anastamoses (ileosigmoidostomy, etc.) is clearly taught as a necessary step of such an operation. Gant does not hesitate to recommend exclusion for angulations, kinks, ptoses, etc.

The new chapters deal with pericolitis, Lane's kinks, Ileal Stasis, Cecum Mobile, etc. While the author's view as regards surgical interference in these still somewhat ill-defined diseases can hardly be called conservative, yet he avoids the rashness and ill-founded enthusiasm of many of the younger surgical writers, and in the main presents a logical and moderate discussion on the subject.

Literary references are profuse, and the views of other writers on all subjects are liberally quoted throughout the volume.

Gant does not see fit to recognize the subject of "dyschezia" in his book, at least he does not identify it by that name. Nor does he have occasion to refer to the recent volume of Hertz on this same subject, a volume which in itself is one of the clearest conceptions of this disease that has appeared in years.

One criticism of this edition seems justified. There is absolutely no use made of the *x*-ray in studying the physiology of the bowels nor of the changes in peristaltis that occur in constipation. The instructive work of Holzknecht, Singer, Stierlin, Hertz and many others is completely ignored, and unjustifiably so.

All in all, the book is a most valuable one, and deserves close study.

A Surgeon in Khaki. By Arthur Anderson Martin, M.D., Ch.B., F.R.C.S. Ed. Late Field Ambulance, 5th Division, 2nd Army; Late Surgical Specialist, No. 6, General Hospital, British Expeditionary Force, etc., Late Civil Surgeon, South African Field Force, 1901. Duodecimo; 216 pages; illustrated. New York: Longmans, Green & Co. $1.00.

This is the posthumous tale of a New Zealand surgeon who, reaching England from New York just as the great war broke out, secured at once a commission as "temporary lieutenant" in the Royal Army Medical Corps, went to France with the expeditionary force in August, 1914, and served there until, with many other British army surgeons, he was killed in the battle of the Somme in 1916.

It is a simple, direct and continuous narrative written in a wholly natural style, without any attempt to make use of the many obvious opportunities for purely literary effect. In this natural but altogether excellent style lies the charm of this highly interesting narrative.

The author tells of the confusion and inefficiency that marked the first days of the war in England and at the front, and his interesting experiences in reaching the ambulance company to which he was assigned during those days of rapid retreat. Then came the battle of the Marne, of which he gives a picture. In that battle his ambulances were parked on the side of a road close to a British battery. "When the enemy shells fell short they fell near us. Our position was a dress-circle box seat. . . It was not every day that one could look on a real live battle." Then follows a thrilling story of the perilous work of securing and caring for the wounded in the succeeding days in which the enemy was being pursued. The story carries on to the Aisne—but we shall tell no more of it here, for you ought to read it yourself. It is a grim story, indeed, replete with horrors, for all its simple telling. "The surgeon sees the very seamy side of war. He comes close to the men stricken down in the field, helpless and bleeding and in pain. He stands by them in their dark hours in hospital and by their bedsides when they die. While the world is hearing the earthquake voice of Victory, he is perhaps kneeling on the straw easing the path to death of a dying man, one of the victors in the fight, or perhaps operating in a mean cottage, surrounded by wounded men waiting their turn on the table. The gallant charge, the brave defence, the storming of the enemy's position are heralded in dispatches and in song and story, but translated into the notebook of the 'Surgeon in Khaki' they represent many dead, many wounded, much crippling and mutilation, tears, distress and broken hearts. . . Yet, though the life of the 'Surgeon in Khaki' is amidst this aftermath of battle, he has the infinite satisfaction of knowing that he can, and does, hold out a hand of help to the hurt and maimed soldier crawling out of the welter of blood and destruction, and that he is doing the work of the Compassionate and Pitying One. . ."

Mortality from Cancer and Other Malignant Tumors in the Registration Area of the United States. Bureau of the Census. Octavo; 212 pages. Washington: Government Printing Office, 1916.

This monograph, compiled from the last census, contained a most elaborate and extensive statistics upon cancer in the United States. We find reported the geographical and regional distribution; relations of cancer deaths to age, sex, occupation, color, nationality, marital state, etc. This compilation should prove invaluable to students of the cancer problem.

Progress in Surgery

A Résumé of Recent Literature.

The Bladder Changes Due to Lesions of the Central Nervous System. Their Description and Treatment.

J. EDWARD BURNS, *Surgery, Gynecology and Obstetrics,* June, 1913.

The chief changes in the bladder due to lesions of the central nervous system consist in diminution in the tone of its musculature and that of the internal vesical sphincter. There follow then a gradual accumulation of residual urine and occasionally dilatation of the bladder. Incontinence results in the majority of cases with dilatation of the internal vesical sphincter and a funnel-shaped posterior urethra which may be readily demonstrated systoscopically and radiographically. Paradoxical incontinence also frequently results. The most effectual form of treatment in these cases consists of intravenous and intraspuious therapy combined with dilatations of the urethra.

The Surgical Treatment of Benign Neoplasms of the Bladder.

EDWIN BEER, New York, *Surgery, Gynecology and Obstetrics,* June, 1917.

All benign papillomata of the bladder that are suitable cases for high frequency cauterization by means of the cystoscope—and the majority of the cases are suitable—can be definitively cured by this method. In the unsuitable cases, intolerant patients, where there is active bleeding which obscures the cystoscopic view, where the tumors are so placed that they cannot be reached through the operating cystoscope, as, for example, behind large prostatic adenomata, or indiverticula, and finally in instances of papillomatosis of the bladder, either primary or following a surgical operation for papilloma after which dozens or hundreds of growths have been implanted all over the bladder. Beer offers the technique of direct cauterization of the growth by means of the Paquelin cautery through the opened bladder. There is no preliminary filling of the bladder with fluid, the bladder incision is gradually enlarged without any sponging or rough handling and each tumor as it presents is burned to a crisp and every suspicious spot, including the edges of the bladder incision, is burned. The whole operative field is finally soaked in alcohol so as to destroy any liable particles that may have accidentally broken off during the manipulation. The patient lies in the Trendelenburg position and the bladder is pulled out of its perivesical bed by its urachal end, permitting of thorough inspection and safeguarding the perivesical space against contamination. This technique has given Beer excellent results.

Report of a Very Large Fetus.

GEORGE L. BRODHEAD, New York, *American Journal of Obstetrics,* June, 1913.

Brodhead reports his personal case of a large fetus which weighed 15 11-16 pounds at full term delivery. The head was delivered by a midwife, but difficulty was encountered in the birth of the shoulders. When extracted it was dead. Inquiry into the literature elicits only one report of a heavier child, 25 pounds at birth, reported by D. P. Belcher.

Puerperal Gangrene of the Leg.

WM. H. WELLINGTON KNIPE, New York. *American Journal of Obstetrics,* June, 1917.

Knipe reports a case of puerperal gangrene of the leg following septic abortion. The bacteria involved were bacillus aerogenes capsulatus, streptococcus and a diplococcus. It started as a thrombophiletritis of the right broad ligament then involving the inferior vena cava, both common iliac veins, external iliac veins and the femoral vein on the right side, while the arteries were in no way involved. There was also a pyemia, bronchopneumonia, abscess of the lung, general peritonitis and death five weeks after the attempted abortion. The gangrene of the leg was complete within eighteen days following the onset of pain in the foot and leg.

A Study of the Anatomy, Pathology and Treatment of Uterine Prolapse, Rectocele and Cystocele.

ROBERT T. FRANK, *Surgery, Gynecology and Obstetrics,* January, 1917.

Frank emphasizes the necessity of considering and treating prolapse of the uterus, rectocele and cystocele from the same viewpoint anatomically and surgically as is inguinal hernia. A sound knowledge of the regional anatomy is of greatest importance. With very few exceptions, anterior and posterior solporrhaphy combined with either the Alexander operation or ventrofixation are applicable to all cases of prolapse or cystorectocele and retroversion both during and after the child-bearing period. The interposition operation is simple to perform according to Frank, but has the disadvantage that it necessitates sterilization and occasions bladder symptoms and recurrence of protrusion after operation for prolapse. Suturing of the isolated levator ani muscle is illusory, and even when the cosmetic results are good, a painful scarry perineum is often noted. For the repair of cystocele the pubocervical ligaments and anterior fibres of the cardinal ligaments are utilized; for repair of rectocele the fasciæ of the rectum is united; the fasciæ of the levator muscle, and the triangular ligament is generally applicable with but few easily recognizable exceptions. Recurrences are to be expected following this technic as follow the operation for inguinal hernia (in general 1 to 10 per cent.).

War Injuries of the Ear. A Résumé of Recent Literature.

J. S. FRASER, Edinburgh. *Edinburgh Medical Journal, Journal of Ophthalmology and Otolaryngology,* April, 1917.

The external ear.—Even severely injured auricles can be saved by promptly suturing the severed portions. Injury to the meatus is often followed by stricture. Sometimes the facial nerve is cut. Direct injuries are almost always fatal unless they happen to be caused by spent bullets that lodge in the petrous bone. Purulent otitis and meningitis are apt to follow.

Middle ear.—Rupture of the drum is due to explosions close to the ear. The tear is irregular in shape and gives the impression of there being a loss of tissue. There is frequently an accompanying concussion of the labyrinth. Purulent otitis usually follows. The prognosis is good. Direct wounds of the middle ear lead to extensive bone injury. Only rarely is the middle ear alone involved. Injuries to the mastoid alone are usually of good prognosis if all the foreign bodies are removed. Concussion of the labyrinth and facial paralysis may follow. Septic thrombosis of the sigmoid sinus has been observed.

Labyrinth.—Injuries may be classified as (A), direct,—due to bullets or fragments of shells. Usually they are immediately fatal. If not, death may follow as late as six weeks after from septic meningitis. (B) Indirect,—due to a blow on the head either with or without fracture of the skull. If the labyrinthine capsule is injured there is a discharge of cerebrospinal fluid from the ear. If not, deafness may be due to hemorrhage into the labyrinth or rupture of the eighth nerve. (C) Noise deafness,—continuous overstimulation results in degenerative changes in Corti's organ and later in the cochlear ganglion and nerve. This is seen in naval gunners and artillerymen. (D) Explosion deafness,—the pathology is vague, several theories having exponents: (1) degenerative neuritis; (2), tearing of the membranous labyrinth; (3) hemorrhage into pons, medulla or cerebellum.

The effects depend upon the caliber of the shell, atmospheric conditions, the angle at which the noise strikes the ear and the distance from the exploding shell. The effects are more serious in an enclosed space, e. g., a trench, than in the open field. If the drum head remains intact the labyrinthine injury is apt to be more severe.

Psychic deafness.—In many cases there are no demonstrable lesions and recovery, when it once begins, is too rapid and complete to be due to a peripheral lesion. Fraser believes it to be due "to the temporary abolition of sensory impulses in a brain already anemic as a result of physical fatigue and mental strain."

Aviators sometimes experience deafness, vertigo and vomiting on rising rapidly to great heights, and in severe cases Meniere's symptom-complex is met with.

APPLICATION FOR APPOINTMENT

IN THE

MEDICAL RESERVE CORPS, U. S. ARMY

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......................., 191

To the SURGEON GENERAL, U. S. Army,
Washington, D. C.

Sir:

I hereby make application to be examined for appointment in the Medical Reserve Corps, U. S. Army, and inclose testimonials as to my character and habits. *

I certify that to the best of my knowledge and belief I am laboring under no mental or physical infirmity or disability which can interfere with the efficient discharge of any duty which may be required of me if appointed in the Medical Reserve Corps, U. S. Army, and that the answers given to the interrogatories below are true and correct in every respect.

I furthermore state my willingness to proceed to such point for examination as may be designated by the Surgeon General, with the understanding that the journey entailed thereby must be made at my own expense.

INTERROGATORIES.

1. What is your name in full (including your full middle name)?

2. What was the date of your birth?

3. Where were you born? (Give State and city or county; if foreign born, give country.)

4. When and where were you naturalized? (For applicants of alien birth only.)

5. Are you married or single? 6. Have you any minor children; if so, how many?

7. What is your height, in inches? 8. Your weight, in pounds?

9. Give the nature and dates of all serious sicknesses and injuries which you have suffered?

10. If either parent or brother or sister has died, state cause and age in each case:

11. Do you use intoxicating liquors or narcotics; if so, to what extent?

12. Have you found your health or habits to interfere with your success in civil life?

13. What academy, high school, college, or university have you attended? State periods of attendance from year to year, and whether you were graduated, giving date or dates of graduation:

14. Name any other educational advantages you have had, such as private tuition, foreign travel, etc.:

15. Give all literary or scientific degrees you have taken, if any, names of institutions granting them, and dates:

16. With what ancient or modern languages or branches of science are you acquainted?

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*Testimonials as to character and habits from at least two reputable persons must accompany this application. Political recommendations are not necessary.

17. How many courses of lectures have you attended? Names of colleges and dates:

18. When and where were you graduated in medicine?

19. Have you been before a State examining board? If so, state when, where and with what result: *

20. Are you a member of any State medical society? If so, give its name:

21. Have you had service in a hospital? If so, state where and in what capacity, giving inclusive dates of each kind of service:

22. What clinical experience have you had in dispensary or private practice?

23. Have you paid particular attention to any specialty in medicine; if so, what branch?

24. What opportunities for instruction or practice in operative surgery have you had?

25. Have you previously been an applicant for entry into the United States service? If so, state when, where, and with what result (if rejected state why):

26. Are you a member of the organized militia? If so, state with what organization and in what capacity:

27. Have you been in the military or naval service of the United States as cadet or otherwise? If so, give inclusive dates of service with each organization, designating it:

28. What occupation, if any, have you followed other than that of student or practitioner?

29. What is your present post-office address?

30. What is your permanent residence?

31. (Signature of applicant) ....

32. The correctness of all the statements made above was subscribed and sworn to by the applicant before me this day of , 191 .

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* This application must be accompanied by a certificate from the proper official that the applicant is duly registered to practice medicine in the State in which he resides.

Form 149
W.D., S.G.O.
(Revised May 3, 1917)

APPLICATION FOR EXAMINATION FOR APPOINTMENT IN THE MEDICAL RESERVE CORPS, U. S. ARMY.

............Inclosures.

American Journal of Surgery

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[American Journal of Anesthesia and Analgesia]

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AN EXPERIMENTAL INVESTIGATION OF THE PHARMACOLOGICAL ACTION OF NITROUS OXID.*

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In the early days nitrous oxid was administered pure or almost pure, air being verey generally excluded. This led to the production of asphyxia after a very brief period and thus the duration of the anesthesia was necessarily short. At a later period it was appreciated that a certain admixture of air with the gas was feasible and even often improved the character and extended the duration of the anesthesia. In 1868 E. Andrews of Chicago first used pure oxygen with nitrous oxid. This was a great advancement, which, although not generally appreciated at that time, has now come to be fully recognized as indispensable in the scientific administration of nitrous oxid.

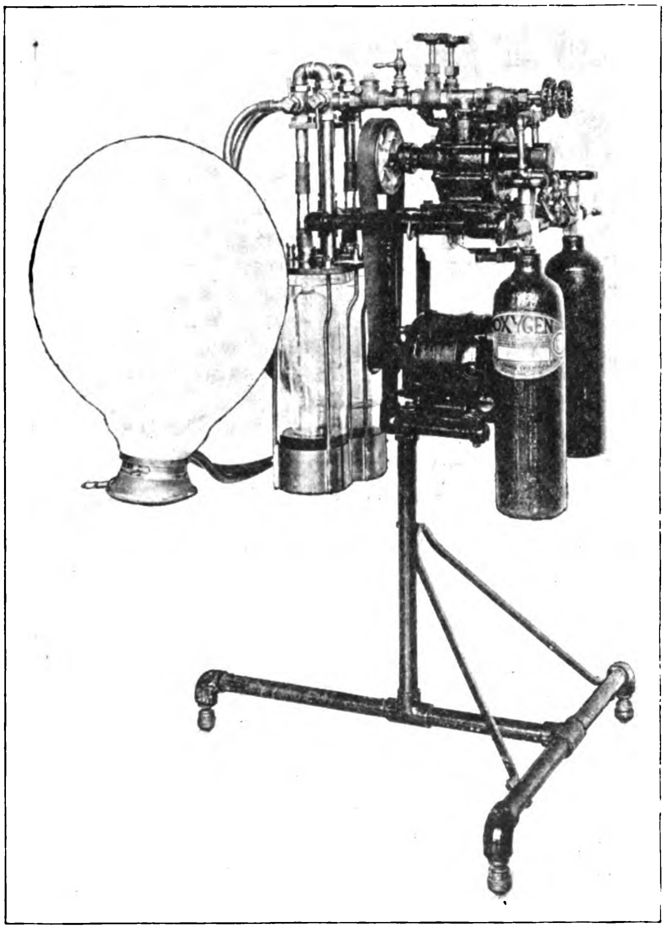

Fig. 1. Nitrous oxid apparatus with large bag as used for experimental purposes. (For discussion, see text.)

Some months ago I devised a closed method for the administration of nitrous oxid and other anesthetics in conjunction with oxygen. I have used a number of different types of apparatus in connection with this method one of which has been described in a former publication.[1, 2] My chief object in the present article is to discuss certain features of the pharmacological action of nitrous oxid as studied by this method. No morphin, scopolamin or other hypnotic has been used in any of the experiments herein reported.

I may refer briefly to an improved form of apparatus which I have used in these experiments (Fig. 1). A rotary pump of less capacity than that used in the device previously described is attached to a very much smaller and more compact frame. The chief object in this has been to simplify the apparatus and to reduce its size and weight. A number of valves, tubes and accessories shown in the illustration have been found by experience to be unnecessary, but in the experimental development of the device they were included as precautionary measures. The apparatus carries only two tanks.

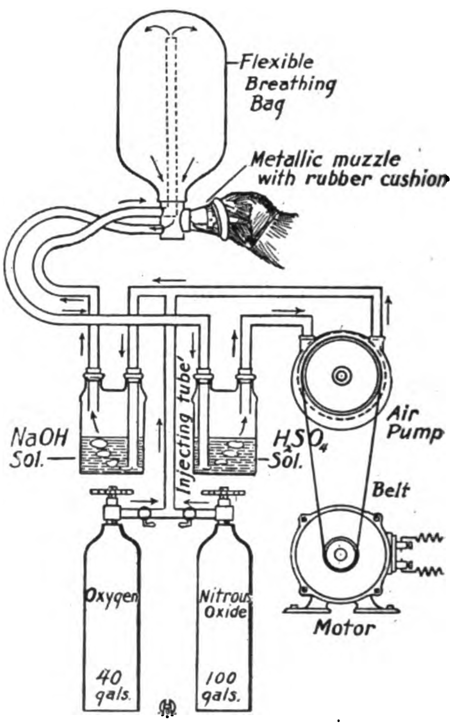

Fig. 2 Schematic diagram to explain the plan of construction of the apparatus shown in Fig. 1. The motor turns the rotary air pump which keeps the air (or gas and oxygen) circulating. (For discussion, see text.)

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*Read by proxy during the second annual meeting of the Interstate Association of Anesthetists in Louisville, Ky., July 26-27, 1916.

one for oxygen and one for nitrous oxid, for experience has shown that since tanks need to be renewed only at considerable intervals, and, if the breathing bag be filled moderately full at the moment when either tank becomes exhausted there will be ample time to remove the empty tank and replace it by a new one before a fresh supply of the gas (generally oxygen, of course) is required. Realizing the great value of simplicity and lightness in any form of apparatus intended for constant use, I have spent much time and energy in trying to produce as simple a device as possible. It is perfectly evident that the apparatus here shown is much more complicated than it need be, but for the benefit of others who may be interested in the subject of nitrous oxid anesthesia, I have thought it worth while to include here an illustration of the apparatus with which much of the work discussed below has been carried out. For a detailed description of the general principles on which the device is operated I must refer the reader to the article indicated above. By further reference to the diagram shown in Fig. 2 it will be seen that by means of a motor and a rotary air pump, air or other gaseous or volatile substances (chiefly nitrous oxid and oxygen so far as the present article is concerned) are kept circulating within a closed system of tubes and vessels, and through a breathing bag into and out of which the animal breathes.

The vessels are two in number and consist of glass jars, the one containing sulphuric acid which serves to sterilize, dry and warm the air (or gases) which are washed through the acid, while the other jar contains sodium hydrate solution through which the air or gases, including the exhaled CO_2 from the patient are washed. The CO_2 is immediately absorbed by the sodium hydrate forming sodium carbonate and water according to the following equation:

$$2\,NaOH + CO_2 = Na_2CO_3 + H_2O.$$

The sodium carbonate being a soluble salt of course remains in solution (together with the H_2O formed) in the jar, the CO_2 being thus removed from the air (or nitrous oxid and oxygen) which the animal breathes. During this process the oxygen is consumed (250 to 300 cc. per minute for an adult man at rest) by the animal or patient. More oxygen is injected into the system from time to time in just such quantities as the animal actually consumes. The nitrous oxid, being a stable gas, is not broken down at all either by the animal or by the acid or sodium hydrate. Consequently there need be but little waste of the N_2O and only a small amount (experimentally I have estimated that from 1½ to 3 gallons will be necessary for a man weighing 160 pounds) is required to saturate the blood sufficiently to produce anesthesia. When a given amount of N_2O is injected into the closed system and breathing bag, the animal, whose lungs virtually form a part of the closed system, will at once begin to absorb N_2O into its blood from the pulmonary alveolar walls. This absorption goes on until an equilibrium in the quantity of N_2O contained in the animal's blood and tissues on the one side and that contained in the breathing bag and tubes on the other is established. It is important, however, to remember in this connection that the affinity of the blood and presumably of the central nervous system is greater for N_2O than is the affinity of water for N_2O. So far as is known at present N_2O does not form any special chemical combination with the blood or other tissues of the body. It is apparently held in solution in the blood and tissues in the same way as any other indifferent gas dissolves in a liquid, i.e., in direct proportion to the partial pressure exerted by the gas on the liquid. The lipoid content of the blood and central nervous system is generally considered to account for the increased solubility of the gas in these tissues over that in water.

The breathing bag and face-piece shown in Fig. 1 are also modified considerably from that which I first used. The bag shown here I have found well adapted for experimental observations. It is chiefly from this standpoint that I want to discuss the action of nitrous oxid in this article. This bag holds three gallons, but the sides of the bag are flat and when not in use fall together as the air or gas passes out. When in use only about one or two gallons of air or gas need be injected into the bag and this permits the subject to have a full and free opportunity to breathe in any way he pleases. It is desirable that no excess pressure, as from an overfilled bag, be introduced to embarrass the breathing of the subject. The excess amount of work which may thus be easily thrown on the respiratory apparatus in the course of an hour may be astounding, as a brief mathematical calculation will readily show. And the problem is still further complicated both directly and indirectly by the embarrassment to the heart and lung circulation which the amount and peculiar application of this excess work involves. A further feature to be noted in the face-piece is the large opening, about three and one-half inches in diameter, which connects the bag to the air cushion resting on the face. Thus the subject breathes almost directly into the large flexible bag and obstruction of the respiration is reduced to a minimum. While this bag and face-piece serve very well for experimental observations, there are certain objections which may be made to them from a practical standpoint. The first of these is the difficulty of making an airtight contact between the subject's face and the rubber cushion on the face-piece. The second is the inconvenience of having the large bag near the patient's head. At present, however, I wish to avoid any extensive discussion of the clinical side of this subject.

THE GASES INVOLVED IN NITROUS OXID ANESTHESIA

The pharmacological relations of at least four gases must always be considered in nitrous oxid anesthesia. These are N_2O, oxygen, CO_2, and nitrogen. And it may be worth while to remember that a small amount of argon, neon, crypton and xenon are also present. Ordinarily these gases are supposed to be inactive in the animal organism, but under the peculiar conditions established in the gaseous content of the body under nitrous oxid anesthesia, I am inclined to believe that the presence of these substances, at least at the beginning of the anesthesia, should not be entirely forgotten.

It should be emphasized that the method which I have here used permits investigation of peculiar gaseous relationships which no other device heretofore employed for this purpose could well reveal. For by this method the supply of the four gases (N_2O, CO_2, N, and O) concerned in the animal's respiration may be separately and independently controlled. The CO_2, of course, is eliminated by the animal, but it may be allowed to accumulate in the breathing bag for experimental purposes and its relative action in combination with the other gases thus studied. The relative effects of CO_2 and O in ordinary forms of breathing and in asphyxia have been thoroughly studied by numerous investigators.[3] When, however, nitrous oxid is introduced, the conditions are very materially changed and only a small amount of work has been done on this phase of the problem.

It was supposed by Sir Humphrey Davy that nitrous oxid was decomposed in the body which thus became flooded with an excess of oxygen, which was promptly changed to carbon dioxid. This carbon dioxid then acted as a depressant and caused the anesthesia. It was later shown that nitrous oxid was not thus broken down but was excreted by the lungs in the same form as that in which it had been absorbed. The theory then became prevalent that nitrous oxid acted solely by excluding oxygen from the tissues and that its action was chiefly a matter of asphyxia. That asphyxia may, and in practice certainly does often play a considerable part during the production of the anesthesia, no one at present doubts. But it has been thoroughly established that nitrous oxid possesses distinct specific depressant powers of its own on the central nervous system. In 1897 Kemp[4] published a series of observations on the gaseous content of the blood during nitrous oxid anesthesia. He drew off blood from the femoral artery of dogs anesthetized with various mixtures of N_2O and air and of N_2O, and O, and found that complete anesthesia could be produced by the gas when the blood contained quantities of oxygen fully capable of maintaining consciousness and of carrying on the ordinary process of metabolism. When nitrogen was substituted for the N_2O, the percentage of oxygen breathed remaining the same, the anesthesia gradually passed off and the animal regained consciousness. And it has been found by the late Sir Frederic W. Hewitt[5] that a mixture of nitrous oxid 80 per cent and oxygen 20 per cent (the amount present in air) is fully capable of producing anesthesia in suitable subjects. These observations prove beyond doubt that N_2O possesses specific depressant powers on the central nervous system. It has also been shown by Kemp as well as by others that under N_2O anesthesia the CO_2 content of the blood is greatly reduced below the normal. But in most cases, however, it has been found that the oxygen content of the blood is reduced in even still greater degree below the normal than is the carbon dioxid. As ordinarily administered N_2O causes the nitrogen (and presumably the argon, etc.) contained normally in solution in the blood and tissues to be rapidly washed out of the system. Kemp's blood analyses for the dog show in several experiments a complete absence of nitrogen from the gases drawn off by the vacuum pump. It is to be noted that in all other forms of anesthesia the nitrogen (about 1.7 vol. per cent) remains dissolved in the blood. *Does the absence of this supposedly inactive gas in any way affect the anesthesia?* In many instances I have observed dogs going under the influence of N_2O in which it appeared to me very probable that the elimination of this nitrogen was essential to the production of successful nitrous oxid anesthesia. It is, unfortunately, extremely difficult to prove this point. For one must, as a general rule, empty out most of the air (nitrogen) from the apparatus (and lungs and tissues of the animal) in order to fill this space with nitrous oxid so as to be able to obtain a sufficiently high percentage of the gas to produce the anesthesia. This makes difficult the solution of the question as to whether or not the absence of the nitrogen in any way influences the nature of the anesthesia. In most forms of nitrous oxid apparatus used heretofore breathing had to be carried on under a greater or less degree of pressure. It is interesting to consider what influence, if any, this may have in tending to dam back the CO_2 produced in the tissues. While this gas did not apparently accumulate in large quantities in the blood in the analyses made by Kemp, still one is inclined to suspect that the tissues may have been trying to form the ordinary amounts of the gas but were either unable to do so or else they could not pass it over to the blood. And any such accumulation of CO_2 in the tissues may very well influence the nature of the anesthesia produced. And similarly any of the immediate precursors of CO_2, is allowed to accumulate in the tissues or blood, may affect the character of the anesthesia produced.

THE SYMPTOMS PRODUCED BY NITROUS OXID.

I have studied this topic both from the standpoint of animals and from that of man.

A frog placed in an atmosphere containing a high percentage (90 to 98 per cent) of N_2O becomes well anesthetized in from three to four minutes. When again placed in fresh air the animal fully recovers in about one minute. Profound anesthesia is readily obtained.

The symptoms in dogs vary greatly with the animal and the method of administration. Fig. 3 shows a record of the respiratory movements in a dog just beginning to inhale N_2O. The animal was lying quietly on the table and made no resistance in any way. The record was obtained by tying a stethograph around the chest wall and connecting it by rubber tubing to a recording tambour. The first part of the tracing shows the normal respiratory movements when the animal was breathing a sufficient percentage of oxygen and the CO_2 was not allowed to accumulate to excess. At the point indicated N_2O was run into the breathing bag and shortly thereafter the depth of the respiration began to increase. This is mainly due to the action of N_2O. It is the typical effect of this gas on the respiration. There is one other point to be considered in the experiment, however, and that is the fact that in this case when the N_2O was run into the bag then the oxygen which the bag contained was considerably diluted. This would also cause the animal to breathe more deeply. But independently of this dilution of the oxygen, the first effects of nitrous oxid in sufficient concentration appear to be to stimulate the respiratory center. After a time, as the animal passes more fully under the influence of the gas, the depth of the respiration decreases while the rate varies somewhat, but on the whole is accelerated beyond the normal This does not seem to be due to any accumulation of CO_2 in the breathing bag or apparatus, for it is very easy to wash out the CO_2 as fast as it is formed. The animal usually does better, however, if a certain amount of rebreathing and CO_2 accumulation is permitted.

These same phenomena occur in the human subject. It is very interesting to experience the beginning action of the gas. If one fills the bag partly full of oxygen and breathes this for a while (washing out the CO_2), he may at first note a very slight sense of fullness in the head and possibly there may be a feeble flushing of the skin, especially of the face and neck. Whether this is due to a slight CO_2 accumulation in the lungs (dead space, etc.), caused by the small amount of obstruction to the normal respiration, or is due entirely to excitement or the mere feeling that one *expects something* I have not been able to determine. It is of but little consequence, however, and soon passes off as one adjusts himself to breathing into and out of the bag. Slight odors, as from a new rubber bag, or of oil from the pump, sometimes cause one to be a little apprehensive. And the mere act of fixing the attention on the respiration is sufficient to cause certain minor variations in most subjects. When the N_2O is turned on, however, there is an immediate feeling of ease in breathing. The sensation can best be compared to the effect of oiling a new machine. One is somewhat surprised how readily he can breathe deeply and fully and without special exertion. This sensation does not occur if one instead of running nitrous oxid into the bag, should fill it to a corresponding degree with oxygen. I have been inclined to believe, therefore, that it is due to a direct stimulation of the respiratory center by the N_2O. I have considered the question of whether or not the processes of diffusion of the gases in the lungs, or the rate or ease of absorption or excretion of the oxygen or CO_2 through the alveolar epithelium might be influenced in any way by the presence of N_2O rather than of nitrogen. I have not been able to reach any conclusion on these matters. It seems probable that certain obscure changes are produced in the metabolism of the tissues on account of the subnormal CO_2 and oxygen content of the blood, as shown by Kemp. It would be interesting to know whether or not these low percentages of CO_2 and oxygen persist in the blood in those cases in which anesthesia is produced by approximately 80 per cent N_2O and 20 per cent oxygen as in Hewitt's experiments. I have occasionally believed that in rare instances in dogs which were fully anesthetized I could raise the percentage of oxygen in the bag to perhaps 30 per cent without allowing the animal to revive. In this case, of course, while I might markedly increase the percentage of oxygen in the bag, I did not correspondingly lessen the amount of N_2O in the animal and in the apparatus. In this feature there is a great difference between the apparatus which I have here used and most other forms of nitrous oxid machines, for in these if the amount of oxygen administered is increased, this generally means a *corresponding diminution of the amount of N_2O given with correspondingly increased chances for variations in the character of the anesthesia.*

I have noted only occasionally, as have a number of my students, that just as one begins to breathe a fairly concentrated mixture of N_2O, there may be detected a faint metallic sweetish taste on the tip of the tongue. The sensation reminds one of the taste of saccharin. In my own case this taste has never lasted for more than a second or two, but one student was able to detect it over a prolonged period. It is probable due to N_2O carried in the blood from the lungs to the taste organs.

It will be noted from Fig. 3 that the animal did not struggle as the gas was administered. In some cases I have seen dogs go quietly to sleep and apparently never be conscious at all that they were being anesthetized. In a gentle animal which is especially susceptible to the gas, this may frequently occur. It is by no means the rule, however, and there is often struggling especially if the animal was excited before the anesthesia was started. It is well known that certain human subjects are especially resistant to the gas and I have frequently found this to be true for dogs. In some cases I have been entirely unable to obtain any true anesthesia at all. In these cases cardiac slowing and other complications nearly always come on as one attempts to crowd the gas. This appears to be partly due to stimulation of the vagus center in the medulla for section of the vagi usually accelerates the heart and this is generally even more marked after atropin. I have seen three or four especially striking cases of this kind. An animal which is excited or struggles is much more liable to manifest these cardiac symptoms. After atropin the animal usually takes the gas considerably better, indicating better aeration of the blood in the lungs from the improved circulation. The slowing of the heart may be very marked and apparently may be the cause of death in some cases. I have not taken string galvanometer tracings of the hearts of these animals, but this would be instructive. It has seemed to me in one or two instances that peculiar arrhythmical contractions were set up in the heart and that this finally ended suddenly either with complete stoppage of the heart, or with the establishment of a condition resembling heart block. The cause of these reactions is not at all clear. One would suspect a lack of oxygen, or CO_2 poisoning, but when the CO_2 is well washed out of the gases breathed and the conditions are the same as those under which other animals have been well anesthetized, then one is inclined to look for a difference in the animals. I suspect that very nearly, if not quite this same thing, may have occurred in a few instances in man.[6] For that reason I wish to refer briefly to Fig. 4, which is a tracing of the apex beat of a dog which was given nitrous oxid. The animal was not a good subject, but was finally apparently well anesthetized. After the anesthesia had continued for perhaps half an hour, the pulse in the femoral artery became irregular and finally stopped rather suddenly. With considerable difficulty the animal was revived by means of intermittent compression of the chest. But when the respiration was restored, the animal did not promptly regain consciousness and remained in a semicomatose or somnolent condition for two or three hours. It was noticed about five hours after the animal revived that the heart was irregular and the tracing here shown was made. The animal improved, and in about a week the heart had apparently returned to normal. The animal was kept for forty days thereafter, but no further cardiac disturbance was observed.

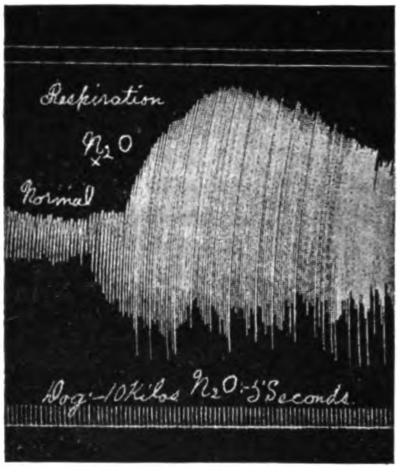

Fig. 3. This tracing shows the respiratory movements of a dog to which (at X) nitrous oxid (plus oxygen) was administered. There is a slight mechanical exaggeration of the respiration record because the animal had been breathing mainly with its diaphragm before the gas was given, but after this the chest movements became much increased. The stethograph recorded more of the thoracic movements than it did of the abdominal.

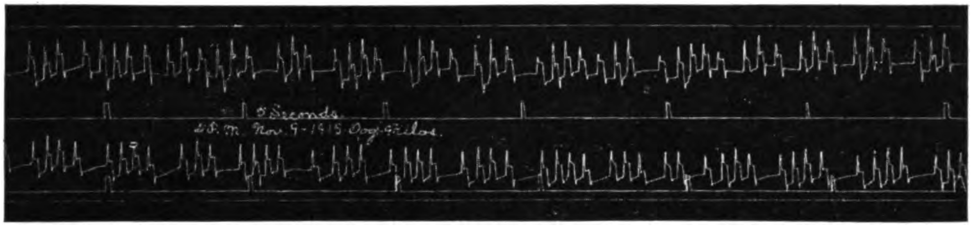

Fig. 4. Tracings of the apex of the heart in a dog in which under nitrous oxide anesthesia cardiac irregularities developed. For a full description, see text. This tracing was taken about five hours after the animal had been anesthetized. At this time it was observed by Mr. John A. Higgins that the animal was in a dazed or semicomatose condition, and that the heart beat was very abnormal. The record here shown was then made.

It seems evident to me that the human subject must be very much more susceptible to nitrous oxid than is the average dog. The anethesia in all cases is of a much lighter form than that produced by ether. In dogs it is as a rule impossible to destroy the corneal reflex, for in the deepest anesthesia in these animals the slightest touch of the cornea or eyelid or even eyelashes causes immediate winking. The eyes remain open and keep up peculiar rolling or staring movements so that one often wonders whether or not the animal is fully anesthetized. If the gas be removed suddenly, however, the animal wakes up and stares about in a way which shows that it had been completely unconscious. During the anesthesia the pupils are dilated but the light reflex is preserved.

The Action of Nitrous Oxid Under Varying Conditions.

If pure N_2O be inhaled, unconsciousness results in a period of from thirty to sixty seconds. But if oxygen be added to the inhaled gas, the time required to produce unconsciousness rapidly increases as the oxygen rises from zero up to five, ten or more per cent. With more than ten or twelve per cent. oxygen content mixtures of nitrous oxid and oxygen usually produce unconsciousness only after considerable periods or not at all, depending on the patient. There seem to be great variations in this respect, however, in the human subject, and I have noted a similar reaction in animals. I should like to emphasize this point in particular since it has a direct bearing on the administration of nitrous oxid by the method which I have here used.

It will be noted by reference to Figs. 1 and 2 that there is a considerable *dead space* in the apparatus. The wash jars, tubes, pump, and the breathing bag all represent space which in the beginning contains air. When the animal is connected to the apparatus then its lungs also add *dead space* to the system. This *dead space* contains oxygen and nitrogen. The oxygen can be readily used up by the animal, but the nitrogen must be gotten rid of. The amount of this nitrogen depends on the construction and size of the apparatus and on the size of the animal. The blood (and tissues) of the animal also contain about 1.7 per cent. of nitrogen which presumably diffuses out into the lungs and is then breathed out when nitrous oxid and oxygen is administered. It is necessary to remove a large part of this nitrogen from the apparatus to secure the best success. This is done by filling the bag partly full of nitrous oxid and running the pump for a while. The animal breathes the mixture of air and N_2O and absorbs a portion of the gas, while at the same time some of the nitrogen in its blood is breathed out. The sodium solution and the sulphuric acid in the wash jars also absorb some nitrous oxid. In a little while the bag is emptied out into the air. This is accomplished by opening a valve on the right (positive) side of the machine while the pump is running. In one or two seconds the bag can be emptied as much as desired and then more N_2O is run in until the bag is about one-half or two-thirds full. This is repeated about three or four times as a rule with dogs. One should not hurry this process. It usually takes at least five minutes to anesthetize a dog deeply and any attempt to crowd the gas faster generally excites the animal and does not improve the anesthesia. It is better to proceed slowly and allow the animal's blood to become as nearly saturated as possible for each concentration of the N_2O. In this manner the action of the drug is brought on slowly and in a perfectly successful experiment the animal may be fully anesthetized apparently without being conscious that anything unusual is occurring. Often it is not necessary to give any oxygen until the animal is anesthetized, for the oxygen in the apparatus and in the lungs serves to keep the animal in good condition for some time. When needed, however, more oxygen should be injected.

It may seem that five minutes is an unreasonably long time to require for the production of nitrous oxid anesthesia. We should remember, however, that much more time than this may be required with ether, and when we think of anesthetizing an animal in thirty to fifty seconds with nitrous oxid it is interesting to consider the possibility of doing this same thing with chloroform or ether vapor which are exceedingly well absorbed by the blood. And it is probable that in any rapidly produced nitrous oxid anesthesia there may be a considerable element of asphyxia which is undesirable.

In this connection I should like to refer to some physiological experiments[7] on respiration which involve certain features usually concerned in nitrous oxid anesthesia.

"1. *The Immediate Effects of Total Rebreathing (Due Chiefly to Excess Carbon Dioxid).*—The nostrils are compressed with a nose-clip and the subject breathes from and into a rubber bag containing 20 to 40 liters of air. The amplitude of respiration is soon augmented, and in the course of a few minutes the subject is panting heavily forty times a minute. He usually develops a typical carbon dioxid headache, but this wears off in fifteen or twenty minutes after the experiment is ended." These results are produced by breathing for a *few minutes* into a closed bag. If in addition to these effects, which are due chiefly to carbon dioxid accumulation, there be added the further effects of oxygen want which are usually present from the very beginning in the administration of nitrous oxid, what will be the results of these purely physiological phenomena when complicated by the addition of nitrous oxid in those forms of apparatus in which rebreathing into and out of a closed bag is carried on for considerable periods of time?

"2. *The Effects of Insufficient Oxygen Without Excess of Carbon Dioxid.*—The above mentioned bag is refilled with 20 to 40 liters of fresh air and the experiment performed again, but with this difference, that a vessel of 1 or 2 liters capacity filled with soda-lime or broken sticks of sodium hydrate is placed between the bag and the subject's mouth so that he breathes through it into and from the bag. The carbon dioxid exhaled by the subject is thus absorbed, and he gradually consumes the oxygen in the bag. As a rule there is *no noticeable deepening or quickening of the breathing,* and the subject will first become cyanosed and then unconscious without appreciable augmentation of breathing. This experiment should *always be carefully supervised,* as it is not free from danger. If continued for more than ten minutes, it is usually followed by a severe frontal headache, developing slowly for several hours thereafter, together with other ill effects and lasting from twenty-four to forty-eight hours." It is particularly interesting to consider this experiment in connection with those forms of nitrous oxid apparatus in which the patient inhales the gas (plus a varying but usually small amount of oxygen) from a tank or

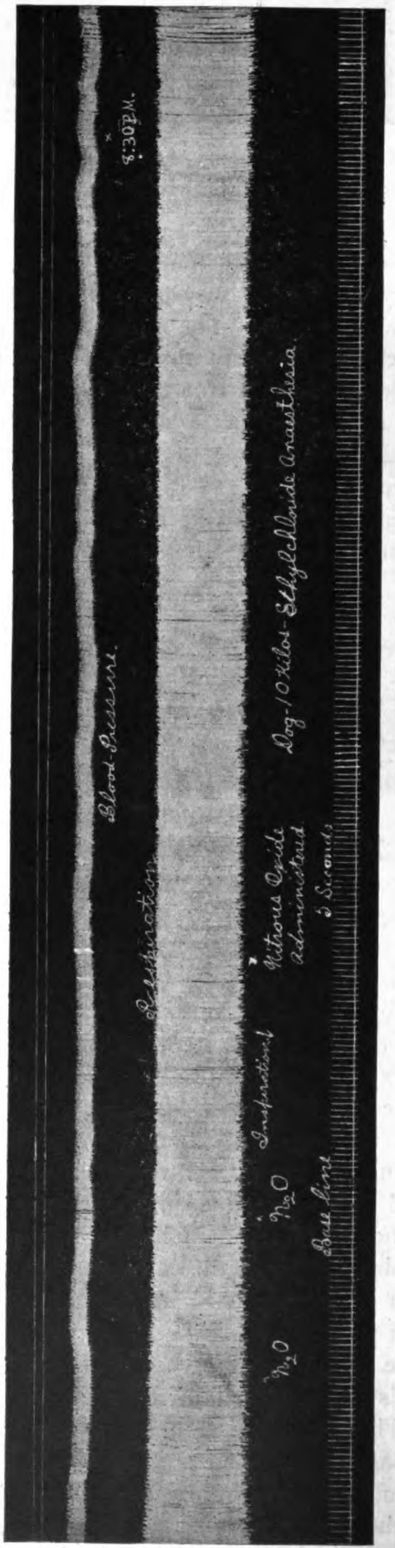

Fig. 5 Blood pressure and respiration in a dog anesthetized with ethyl chlorid. At three places, as shown on the record, nitrous oxid was run into the breathing bag. This was done in order to observe the effects of the gas on the circulation and respiration. The results were practically nil so far as can be observed from the record.

reservoir and then exhales out into the open air. In these machines the carbon dioxid is probably fairly completely removed as fast as it is exhaled from the lungs. The small percentage of oxygen usually given (e.g., from two to ten or twelve per cent.) with the nitrous oxid may cause a rather close simulation of the conditions established in the above experiment in which *cyanosis* and *unconsciousness* may be produced *without any anesthetic.* I should like to give one further quotation bearing on the point from Haldane and Poulton.[8] * * * "Still more sudden exposures to anoxemia occur when air containing little or no oxygen is breathed; for in this case the oxygen previously present in the alveolar air, and even in the venous blood, is rapidly washed out; the result is that consciousness is suddenly lost *without evident preceding hyperpnea,* although abundance of CO_2 is present in the arterial blood. Haldane and Lorrain Smith observed sudden loss of consciousness after 50 seconds on breathing air which was afterwards found to contain 1.8 per cent. of oxygen. During any exertion the loss of consciousness is still more sudden. This is a common experience with miners going into an atmosphere of nearly pure fire damp (CH_4), or climbing up so that their heads are in the gas, that they drop suddenly as if they were shot."

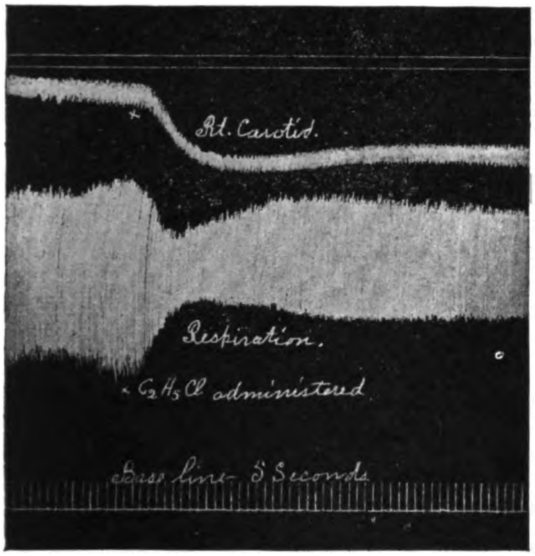

Fig. 6. This animal was anesthetized with nitrous oxid. At the point indicated ethyl chlorid was injected into the bag. There is an immediate fall in pressure and the respiration is much diminished.

I do not care to discuss this point further, but may state briefly that my own experiments, together with the results obtained by others, have led me to conclude that it is impossible to obtain a rapid (1 minute) production of anesthesia and unconsciousness in dogs with nitrous oxid and oxygen at atmospheric pressure unless the oxygen content of the mixture is so low that the loss of consciousness is due *almost entirely* to the lack of oxygen. Presumably, with certain modifications, this is true in the human subject also. On the other hand it seems probable that in all dogs which do not possess a special idiosyncrasy against the gas, mixtures of nitrous and oxid and oxygen containing sufficient amounts of the latter to avoid most if not all asphyxial effects, may be used to produce anesthesia *provided sufficient time be allowed for the gas to act and the CO_2 be completely removed as fast as it is excreted by the lungs.* If a high per

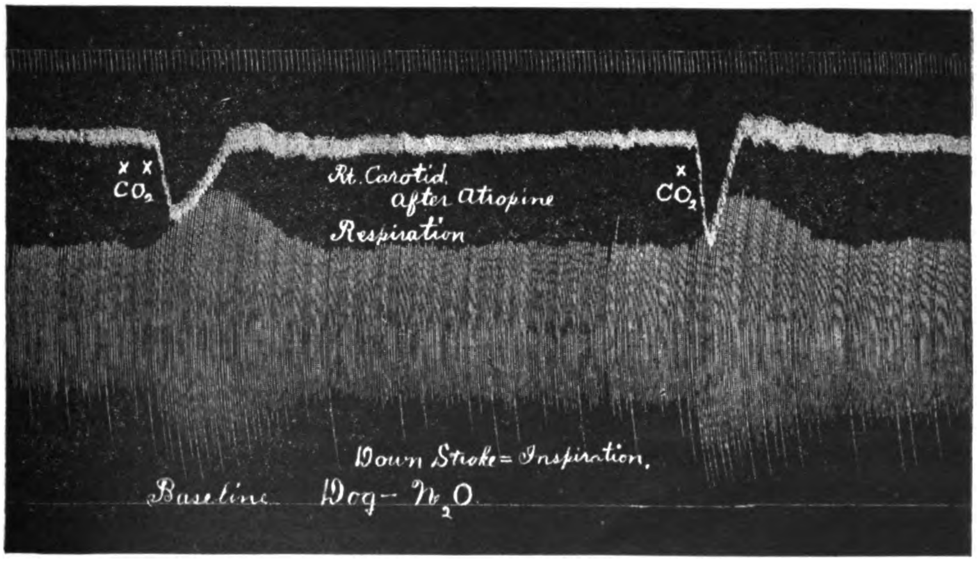

Fig. 7 This tracing was made in a class experiment by Messrs. Mitchell, Day, Lucking and McKee. It shows the results produced on the respiration and blood pressure by injecting (twice) a small amount of carbon dioxid into the breathing bag while the dog was anesthetized by nitrous oxid. In each case the CO_2 was quickly emptied out of the bag after the animal began to show marked symptoms.

cent of oxygen is used, anesthesia cannot be quickly produced but asphyxia may be avoided. The time required may be considerable, perhaps from five to fifteen minutes or longer. But as the tissues gradually become more and more saturated with the gas, there will be a gradual depression of the central nervous system which will finally result in unconsciousness.

It was long ago observed by Goldstein[9] that anesthesia appears more quickly and with a proportionately less degree of asphyxia, the higher the organization of the brain—namely, earlier in man than in laboratory animals. I have been able to confirm this observation many times. And in addition the anesthesia appears as a general rule to be deeper in man than in dogs, although in some animals a profound anesthesia may be readily obtained if all carbon dioxid effects be carefully avoided.

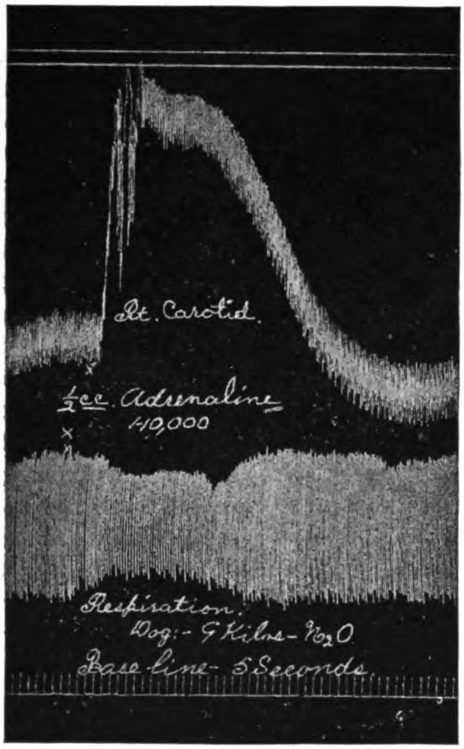

Fig. 8. The animal was anesthetized with nitrous oxid. At the point indicated adrenaline (½ c.c. 1-10,000) was injected intravenously. The vagi were intact. (For discussion, see text.)

It seems probable that in average cases the heart and circulation are not much affected by the gas. Fig. 5 shows the result produced by injecting nitrous oxid into the breathing bag when the animal was already anesthetized by ethyl chlorid. Three injections were made but the effects on both blood pressure and respiration were practically nil. This corresponds very well to the injection of an ordinary drug solution into the femoral vein when an animal is anesthetized with ether. (Fig. 6 shows the reverse of this experiment and illustrates the action of ethyl chlorid on an animal already anesthetized by nitrous oxid.) As a kind of check on these experiments another tracing (Fig. 7) is shown in which at two places a small amount of carbon dioxid was injected from a tank into the breathing bag. There is an immediate stimulation of the respiration and the blood pressure falls, probably from a direct action on the heart. The gas was quickly emptied out and the bag was again refilled with nitrous oxid plus a suitable amount of oxygen. This shows quite well the action of even small amounts of carbon dioxid. I strongly suspect that some such action as this, either by excess of carbon dioxid, or from lack of oxygen, or both, constitutes the real cause of the undesirable after effects which are liable to follow from prolonged nitrous oxid anesthesia. And I am inclined to believe that these after effects may be very generally avoided by a correct and scientific administration of nitrous oxid.

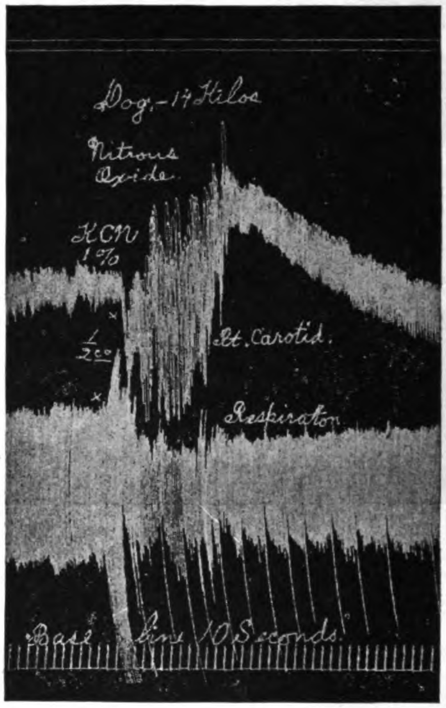

Fig. 9. Dog anesthetized with nitrous oxid. At the point indicated ½ c.c. of 1 per cent. KCN was injected intravenously. The vagi was intact. (For discussion, see text.)

I have repeatedly observed, as have others, independently in my laboratory, that if one breathes a mixture of nitrous oxid and oxygen for a certain time, for example five minutes, and then passes under the influence of the gas to a given degree, he can then considerably increase the quantity of oxygen in the bag without lessening the influence of the nitrous oxid so far as the subject of the experiment himself can determine. The reason for this appears to be as follows: On breathing the N_2O at first the whole body of the subject after a time becomes saturated with the gas at the given partial pressure. (As the first portion of gas is absorbed, one can see the bag shrink fairly rapidly with animals.) More N_2O must be run into the bag to replace that absorbed. But after the anesthesia or analgesia has reached a given degree, then if no more gas, but only oxygen, is given, the effects of the N_2O on the subject should remain fairly constant. It will be noted that the gas is excreted only into the bag from which in a given time approximately the same quantity of N_2O will pass back again into the blood. Supposing the bag was filled to the amount of two gallons (For clearness of description I have assumed that the *volume* of one gallon of the gas may be considered equal to the volume of four quarts. We need not consider variations of temperature, pressure, etc.) with 90 per cent N_2O and 10 per cent oxygen. If then one adds a quart of oxygen to the bag the per cent of oxygen the patient would breathe should be increased by one-ninth of the total amount of mixed gases in the bag after the quart of oxygen is added. It would appear that this oxygen should be readily absorbed by the lungs in approximately the same proportion and quantity as oxygen is absorbed by the blood from the air (which contains oxygen in about the same proportion as the bag would now contain it, i.e., about 20 per cent). This would probably not be quite correct, for nitrous oxid has some power to displace oxygen from its solution in water (Sir Humphrey Davy[10]), and this probably holds good for the blood in the pulmonary capillaries also. On the other hand, when the quart of oxygen is run into the bag, the latter will be expanded by a volume equal to one quart and into this space the nitrous oxid already in the bag and also that dissolved in the blood and tissues of the subject, may diffuse. But if, for example, the blood and tissues of the subject had absorbed two gallons of N_2O and the bag contained two and one-fourth gallons of (mixed) gases after the quart of oxygen was added, then there would be a chance for the N_2O to be diluted by approximately one-seventeenth of the total volume of gases or 5.8 per cent. At that time the subject might be breathing almost 20 per cent of oxygen and this is readily absorbed by the hemoglobin of the blood. In other words, the relative increase in percentage of oxygen breathed when a given amount of oxygen is added to the bag, is greater than is the relative amount of dilution of the nitrous oxid with which the subject is saturated after the oxygen is added to the bag.

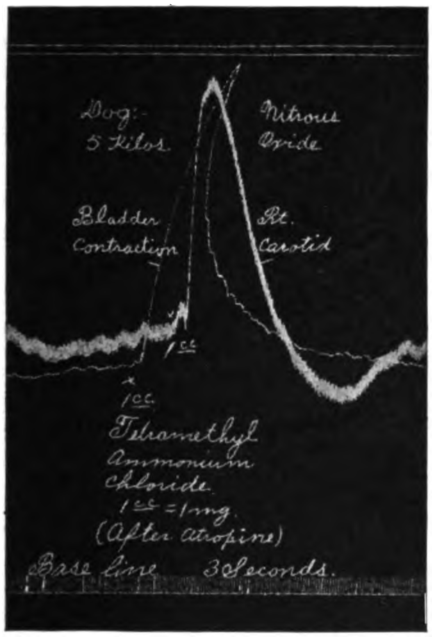

Fig. 10 Dog anesthetized with nitrous oxid. The tracing shows the blood pressure (Rt. carotid) and the bladder contractions (upstroke). At the point indicated 1 c.c. of tetramethylammoniumchlorid was injected intravenously. The animal had previously received 1½ mgs. of atropin.

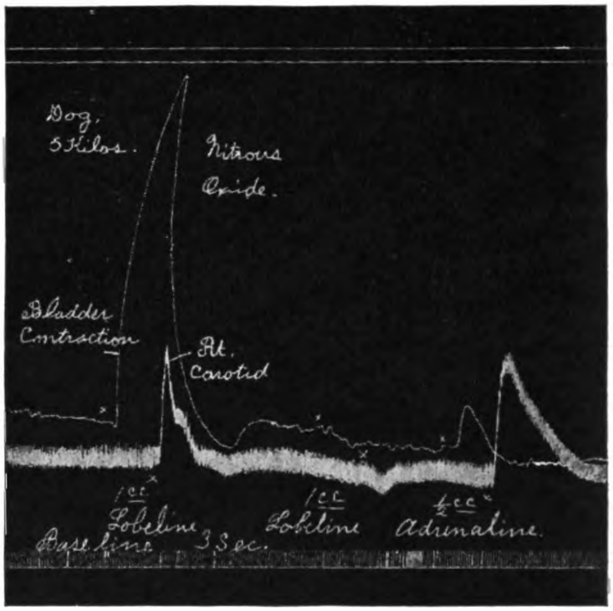

Fig. 11. Dog under nitrous oxid anesthesia. Bladder contractions (up-stroke) and blood pressure. At the point indicated (on the left) 1 c.c. of lobelin was given intravenously. A marked contraction of the bladder and a small rise in blood pressure were produced. A little later a second dose of 1 c.c. of lobelin was given. Almost no results were produced by this, showing that the first dose of lobelin had produced ganglionic paralysis. Later a small dose (½ c.c.) of adrenalin was injected. This gave a slight bladder contraction and a small rise in blood pressure.

It was shown by Van Arsdale[11] in 1891 that the breathing of nitrous oxid to and fro from a bag in which the gas (plus the desired amount of oxygen) was contained at an increased pressure above that of the atmosphere caused an increase in the depth of the narcosis produced. (This was an entirely different principle from that which Paul Bert[12] and later Claude Martin[13] used in which the patient or animal was placed in an air-tight room, the air pressure in which was raised one-fourth above that of the atmosphere after which 80 per cent N_2O plus 20 per cent oxygen was administered to the patient or animal.) I have tried to verify Van Arsdale's results many times. In some cases (with dogs) increasing the pressure of the gas in the bag does deepen the anesthesia, but in many other cases I have not been able to demonstrate any advantage from this increased pressure. Perhaps the increased respiratory exertion, the marked hindrance to the pulmonary circulation and the attendant obstruction of gaseous exchange in the lungs were sufficient in many cases to overcome the advantages of the increase in absorption of the N_2O which the raised pressure might bring about.

The intravenous injection of adrenalin in an animal under nitrous oxid anesthesia gives a practically normal reaction, i.e., the record is almost exactly like that produced by adrenalin in an animal under ether. The rise in pressure here probably supplies more oxygen to the brain and whatever asphyxia may have been present from the administration of the nitrous oxid is thereby reduced (see Fig. 8). On the other hand, the injection of cyanides (which are supposed to cause an internal asphyxia by lessening the tissue oxidations through inhibiting ferment action) causes a markedly increased reaction both as regards the respiration and the circulation. The animal also shows a more marked convulsive reaction than it does under ether (see Fig. 9). I have controlled this by anesthetizing the animal first with N_2O and obtaining records of the blood pressure and respiration from the cyanides and then giving the animal ether, after which more records were obtained.

The motor areas are much more sensitive under nitrous oxid than under ether. One can easily secure very extensive movements of the muscles of the opposite side and can readily pick out the areas for individual groups of muscles. I have observed that dogs under nitrous oxid anesthesia may not well withstand extensive operations, particularly if the abdomen is opened and the viscera manipulated in any way.

In several respects there is a striking similarity between the effects of nitrous oxid and those of morphin in dogs. Among these may be mentioned the production of Cheyne-Stokes respiration. This is generally present in prolonged anesthesia in dogs. The irritability of the cord is also much less depressed than is the case with the methane series of anesthetics and this action also closely resembles that of morphin. As under morphin defecation also sometimes occurs, but I have generally been inclined to attribute this to asphyxia, although other factors may be involved. A peculiar feature is often noticed in the fact that the dogs, while lying quietly and apparently fairly well anesthetized, may be aroused and waked up by stimulation or shaking in a manner very similar to that possible under a moderate dose of morphin. When thus aroused there is also often observed a marked acceleration and increase in the strength of the heart beat. If the animal be again left alone it will soon return into the somnolent, or perhaps analgesic state, very much as occurs after morphin. It is difficult to study the analgesic effect of nitrous oxid separately and apart from the production of total unconsciousness in dogs, for these animals, so long as they are conscious, are very likely to struggle and try to escape even though they feel no pain whatsoever.

The thought has occurred to me many times that nitrous oxid might be used as a hypnotic. By ordinary methods of administration this is obviously impractical. But by a slight modification of the apparatus which I have used I am inclined to believe this idea might be very well put into practice. I have tried repeatedly to compare the mild on-coming effects of the gas as breathed with a considerable proportion of oxygen with the physical and mental sensations present as one begins to fall asleep. There is a very striking similarity, a marked feeling of tiredness and exhaustion, the limbs feel heavy and the eyelids tend to close. One's mentality gradually sinks and there is difficulty in maintaining connected thought. The natural inclination of the subject of the experiment is to lie down quietly and fall asleep. The sensations remind one of the feelings of a child worn out by a long day's play when it lies down at night to sleep. Sometimes I have noted slight muscular twitchings or feeble jumping or convulsive movements. These would probably not occur if the gas were administered very slowly with plenty of oxygen and a sufficiently long period of time were used to bring on the action of the drug. Suggestion appears to play a noticeable part in this action, for if one keeps perfectly quiet and at rest and tries to go to sleep, then the somnolent action of the gas is especially liable to be well marked. It would appear that this matter of suggestion extends even to dogs. For an animal which is petted and induced to lie down quietly and at complete rest may very often take the gas readily and peacefully fall asleep.

Bibliography.

1. Jackson, D. E.: Jour. Lab. and Clin. Med., 1916, i. p. 644.
2. Jackson, D. E.: Jour. Lab. and Clin. Med., 1915, i. p. 1.
3. Henderson, Yandell: Jour Amer. Med. Assn., 1914, April 11, p. 1133. Also Douglas, C. G.; Literature in the Ergebnisse der Physiologie, 1914, xiv, p. 338.
4. Kemp, George: Brit. Med. Jour., 1897, ii. p. 1480.
5. Hewitt, F. W.: "Anesthetics and Their Administration." London, 1912, p. 312.
6. See Robinson, G. Canby: "Transient Auricular Fibrillation in a Healthy Man Following Hydrogen Sulphide Poisoning," Jour. Amer. Med. Assn., 1916, May 20, p. 1611. See also Willett and Tyrrell (2 cases): The Lancet, London, 1902, March 29, p. 897. In both of these cases I suspect cardiac irregularities were present.
7. Henderson, Yandell: Jour. Amer. Med. Assn., 1914, April 11, p. 1134.
8. Haldane, J. S., and Poulton, E. P.: Jour. Physiology, 1908, xxxvii, p. 401.
9. See Gwathney: "Anesthesia," New York, 1914, p. 127. Brunn: "Die Allgemeinnarkose," Stuttgart, 1913, p. 327.
10. Hewitt, Sir Frederic W.: "Anesthetics," London, 1912, p. 91.
11. Van Arsdale, William Waldo: Amer. Jour. Med. Sc., 1891, cii, p. 142.
12. Bert, Paul: Comptes rendus, 1879, lxxxvii, No. 20, p. 728. Also xcvi, p. 1271.
13. Martin, Claude: Comptes rendus, 1888, cvi, p. 290. Also L'Union Médicale, 3 sér, 45, 1888.

PATHOLOGICAL PULMONARY CHANGES FOLLOWING INTRATRACHEAL ANESTHESIA FOR EXPERIMENTAL LUNG SURGERY.*

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Although much experimental work has been done upon the surgery of the lungs and some operations of this kind have been successfully performed upon man, it still continues to be a dangerous field for surgery and some facts may yet be discovered experimentally which will prove of practical value in performing these operations upon man.

The experimental work which forms the basis of this paper was done by means of Meltzer's insufflation apparatus in which the pressure was furnished at first by the operation of a pair of bellows and later by means of compressed air.

The use of intratracheal insufflation to maintain an adequate pressure of air while operating upon the thoracic organs has been known since the time of Vesalius who in 1560 discovered that he could prolong the life of an animal after opening its thorax to study the motions of the heart by blowing through a tube introduced into the trachea.

Robert Hook on October 29, 1667, delivered an address before the Royal Philosophical Society in which he showed that the respiratory movements were simply for the purpose of bringing about a supply of fresh air to the lungs. He experimented upon a dog, opened its chest and kept it alive by blowing air into its lungs by means of bellows, occasionally permitting the lungs to collapse and then distending them. Upon ceasing the blast the dog would fall into dying convulsive fits but revived again upon inflating the lungs.

During the latter part of the eighteenth century the bellows were generally used in England to resuscitate people who had been drowned and it was then known that there was danger of over distension of the lungs if the blast was made too vigorously.

Desault in 1790 introduced a rubber catheter into the trachea in order to relieve difficult breathing due to stricture of the larynx. In 1827 Le Roy pointed out that if a very high pressure were maintained with the bellows it might result in emphysema and death. The use of an introlaryngeal tube for croup was described by Bouchut in 1857-58, and O'Dwyer of New York described his intubation apparatus for diphtheria in 1885. In 1887 Fell of Albany described his method of artificial respiration by means of a pair of bellows and a tracheotomy tube. Francois Frank brought out two forms of positive pressure apparatus in 1896. In the same year Quenu and Longuet made a positive pressure apparatus and Tuffier advocated insufflation in operations upon the pleural cavity. This was tested experimentally upon animals and clinically in operations upon man in the hospitals of Paris. In Quenu's apparatus the head was placed in a chamber which resembled a diver's helmet. Compressed air and chloroform were used for the insufflation. In 1900 Matas employed the Fell-O'Dwyer method in intrathoracic surgery.

In 1904 the attention of experimenters in intrathoracic surgery was somewhat diverted from the use of positive pressure by the researches of Sauerbruch of Germany. The latter, following the advice of Mikulicz had done considerable experimentation with the object of overcoming the ill effects of pneumo thorax during and after intrathoracic operations by the use of negative pressure. Woillez in 1875 had already invented his *Spirophore* which made use of negative pressure. Sauerbruch enlarged the *spirophore* at first to the size of a small cabinet just large enough for operating upon dogs and later on into the form of a cabinet large enough for operations upon man. As a result of much experimentation upon dogs Sauerbruch concluded that positive pressure produces numerous disturbances in the normal circulation in the lungs. Brauer (1904) and Seidel (1907), however, found that the changes were so slight as to be of no importance when only enough positive pressure is used to prevent pneumothorax. Cloetta (1910-1913) made some experiments with a special lung plethysmograph to determine the effects of positive and negative pressure upon the circulation in the lungs. He resected the chest wall and placed the lungs in a glass plethysmograph and stopped the respiratory movements by the use of curare. In this manner he proved that if the lung is distended to the same degree exactly by positive and negative pressure, one-third less pressure is required with the negative than with the positive or if the same amount of pressure is used in each case the lung will be more distended with negative pressure. Furthermore, he showed that with the same distension of the lungs, the aortic pressure falls more with positive pressure than negative and that the pressure in the pulmonary artery rises higher with positive pressure and there is an increased diastolic pressure in the right ventricle. A high degree of positive pressure results in compression of the lung capillaries. Experience has shown that a slight degree of positive pressure is not dangerous but high or long continued pressure may result in serious reflex disturbances in the lungs and deleterious effects upon the circulation, depending upon the reserve power of the right ventricle.

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All animal experiments seem to show that total extirpation of one lung has a higher mortality with positive pressure than negative, because the pressure of air in the empty pleural cavity which cannot be entirely driven out prevents the collapse of the chest wall and change in position of the diaphragm, mediastinum and sound lung which is necessary for recovery. These facts have been well established by experimental evidence. Block, Gluck and Schmid made researches of this kind in 1881. Biondi in 1884 obtained four recoveries in fifteen operations. Mayer of Brussels reported two recoveries in seventeen total pneumectomies on dogs. Janeway removed one entire lung in five dogs with recovery, using positive pressure. Sauerbruch and Haecker, using positive pressure, lost thirty-four dogs out of thirty-eight in their first series of experiments. The extirpation was done through one intercostal incision. Eleven died of leakage from the bronchial stump, five from primary infection at the time of operation and eighteen from the pressure resulting from pleural exudate. In the second series of twelve dogs, eight died.

Robinson in 1908 reported a series of thirty thoracic operations on dogs by means of his positive pressure apparatus. In this series there were nine deaths and twenty-one recoveries. There were nine simple pleurotomies with two deaths and seven recoveries. One experiment was merely the application of the positive pressure without opening the thorax to demonstrate whether the method of anesthesia was dangerous in itself and this ended in recovery. There were nineteen excisions of the lung with seven deaths and twelve recoveries. Another experiment consisted in clamping and releasing the lower lobe of the lung and ended in recovery.

Willy Meyer under a combination of positive and negative pressure performed twenty-one total excisions of the lung with seventeen recoveries. Removal of one or more lobes was done six times with five recoveries. In a series of twenty-four cases there were twenty-two recoveries. At one time twelve dogs were operated upon without a single death. Giertz operating with positive and negative pressure, used a flap of the fascia lata for covering the wound in the lung after resection and had eight recoveries out of ten operations upon large dogs. In rabbits there were no deaths. Robinson and Sauerbruch in 1910 found they got better results by resecting four ribs when a complete extirpation of one lung is done than if the operation is done through an intercostal space. The collapse of the chest wall thus obtained helps to close off the space left in the chest cavity thus tending to prevent pneumothorax but if a larger resection is done the animal may die because the operated chest wall offers no resistance to pressure within the sound lung, as a result of which the thin mediastinum is apt to rupture, resulting in a double pneumothorax.

Schlesinger in 1911, using Meltzer's apparatus, did seventeen total pneumectomies with five recoveries. He generally found air in the pleural cavity postmortem in the operated side and sometimes in the unoperated side. Kawamura (1914) has successfully removed the entire left lung of dogs and in a few instances a part of the right lung also at a second operation. This was done by means of Shoemaker's positive pressure apparatus.

So far there have been sixteen cases of pneumectomy in man with eight deaths. Helferich, 1898, removed the middle and lower lobes of the right lung in man for sarcoma of the chest wall. Heidenhein in 1901 removed the left lower lobe of the lung for bronchiectasis and this was followed by a fistula. Stretton in 1906 successfully resected the upper lobe of the right lung for tuberculosis. Robinson in 1912 removed the lower lobe of the left lung for bronchiectasis. Kümmell in 1911 removed the entire right lung from a man, 48 years old, for carcinoma. This patient died on the sixth day from edema of the lungs and tracheal rattling. Postmortem showed necrosis of the lung stump on account of the fact that the bronchi and vessels of the lung were clamped with forceps.

Resection of the lung is a very dangerous operation both on dogs and on the human being on account of the danger of pneumothorax and of the difficulty of making a hermetic closure of the bronchus and lung. Infection may also take place from the outside if the wound gapes open or drainage is used. Another source of infection of the lungs and bronchi may result from the presence of germs in the nose and throat which are driven inward by the insufflation apparatus. This is particularly true of dogs which are affected with distemper as may be seen from my experiments. Distemper is a nasopharyngeal catarrh occuring in dogs and caused, as Ferry proved, by the bacillus, bronchi-septicus. The disease is accompanied by respiratory, abdominal and nervous symptoms and often results in death. It is the common presence of this infection in dogs together with their necessary confinement in laboratories, when accustomed to an out-door life, which lowers their resistance to surgical operations and makes the results of experimental surgery much less favorable than the same operations upon man.

The statistics of experiments in lung surgery with positive and negative pressure show much better results with the latter because it produces conditions closely resembling the physiological. Robinson and Sauerbruch in 1909 concluded that the space left behind after doing intrathoracic operations under negative pressure diminishes rapidly but that this is not the case in such operations done under positive pressure as most of the dogs died from the formation of an exudate. I found similar results in my experiments. Kawamura, however, found no exudate after his operations although he used Shoemaker's positive pressure apparatus. The great difficulty in these operations is to prevent pneumothorax and infection, both from the interior of the lung and the outside, without causing any damage to the histologic structure and circulation in the lungs.

Dogs are especially unfavorable subjects for these operations on account of the shock which results from exposure and loss of body temperature, their inability to stand pneumothorax well and their low resistance to infection in the pleural cavity. They bear peritoneal infection very much better as can be seen from the numerous successful abdominal operations that have been performed upon them. The pleuritic exudate which generally forms after these operations acts unfavorably because the normal circulation is important for the elimination of germs from the pleural cavity as was proved by Nötzel's experiments. This fluid is absorbed very much more slowly by the inflamed than by healthy pleura. Grober in 1901 thought that this slow absorption was due to the fact that the stomata are closed by fibrin and that the endothelium is damaged by the inflammation. The same is true of the absorption of air in pneumothorax. Dorpat in 1893 showed that 78 cubic centimeters of air was absorbed in twenty-four hours by a dog weighing 11.7 kilograms, but that it took four days to absorb 35 cubic centimeters of air when the pleura is inflamed.

The exudate which forms after a thoractomy causes compression of the lung which has a bad effect upon its circulation and function. Secondary infection of the compressed lung may result in the formation of areas of pneumonia as may be seen from my experiments. Drainage is apt to be allowed by pneumothorax and secondary infection of the pleura. In experiment VI where the entire left lung was removed, the entire pleural cavity on that side was filled with a thick fibrinous coagulated exudate. This was nature's effort to overcome the bad effects of pneumothorax. Tiegel invented a drain which allows fluids to escape, but prevents the entrance of air or fluid into the pleural cavity. In the case of wounds of the lung in man, pneumothorax can be prevented by the use of Tiegel's drain and emphysema may be treated by aspiration according to Bier's method.

The peculiar anatomy of the dog's thorax gives it very little resistance to penumothorax. In this respect it differs from the rabbit very much. The thorax in man offers considerable resistance to pneumothorax as in only about 5 per cent. of intrathoracic operations does it become necessary to use any apparatus to prevent pneumothorax. Surgeons have known this in the past because numerous operations have been done for empyema and lung abscess without the use of any differential pressure apparatus. In chronic cases of empyema, owing to the formation of firm adhesions between the lung and parietal pleura and because of the fixed position of the mediastinum it is possible to resect portions of all the ribs of one side without danger to life. Children can usually stand extensive resections of the chest wall and lung because their relatively soft chest wall can readily contract and the diaphragm lies high so that the space which is left behind soon becomes closed off. Conditions in the rabbit are similar.

In the dog these conditions are entirely different as the animal will die in a few minutes if a wide opening is made in the chest without the use of differential pressure. In this animal the mediastinum is a wide, very delicate and transparent membrane and there is a mediastinal band extending from the neck to the diaphragm. On this account it is unable to resist any marked changes of pressure within the thorax without injury to the heart and pulmonary circulation. The thickness and rigidity of the mediastinum in rabbits enables them to stand pneumothorax for a long time. Although the operated lung and heart follow the mediastinum into the normal side of the thorax during inspiration, still the mediastinum gets into its normal position during expiration. In the case of the dog the mediastinum is so loose and delicate that it flutters up into the wound and often becomes perforated thus allowing air to get into the sound half of the thorax resulting in double pneumothorax. In consequence of this the pressure of the external air in the opened side of the thorax exercises dangerous compression upon the normal lung which is unable to drive the air out entirely even with the help of the diaphragm and the accessory muscles of respiration. Le Play and Mantoux showed that by induced pneumothorax they could render all but one-sixth of a dog's lungs atelectatic without causing death.

INTRATRACHEAL INSUFFLATION.

In 1910 Meltzer introduced his method of intratracheal insufflation for the purpose of maintaining a positive pressure within the lungs in order to prevent pneumothorax during intrathoracic operations. The technic of this method was established by a long series of experiments upon dogs. A soft rubber catheter is introduced through the larynx into the trachea after the patient has been thoroughly anesthetized. The lower jaw is propped widely open and the tongue is drawn forward until the epiglottis is recognized. The latter is then drawn forward with a long pair of curved forceps and the catheter passed along the forefinger until it enters into the larynx. The catheter should be provided with a terminal opening instead of a lateral one. After the catheter is introduced as far as it will go it is deeply in the right bronchus and it should be slightly withdrawn (about 5 to 6 centimeters) and secured in position so that it will not slip out of place. It should be determined whether the catheter is in the trachea or esophagus, as acute dilatation of the stomach will result if it is in the latter. This will prove fatal unless the air is removed from the stomach by disconnecting the catheter with the apparatus and making pressure over the stomach until the distension is relieved.

After the catheter is attached to the insufflation apparatus, ether mixed with air is blown into the lungs either by pressure upon a pair of bellows or by a connection with a compressed air apparatus. This apparatus is connected with a mercury safety valve which is set at 30 millimeters so that if the pressure in the apparatus exceeds that point the excess of air will bubble off through the mercury. The average pressure which should be maintained for intrathoracic operations upon dogs is 18 to 25 millimeters. The pressure in operations upon man may be raised to 35 to 40 millimeters. Meltzer considers it safe at any point below 50 to 60 millimeters. There is also a valve attachment to the apparatus for the purpose of releasing the pressure in the lungs about six times a minute for a period of two seconds at a time to prevent shock and damage to the lungs. This also relieves the obstruction to the flow of venous blood to the right auricle from the great veins of the chest and abdomen. The size of the French catheter varies from 18 to 24 or with a diameter of 8 millimeters and a lumen of 4 millimeters according to the size of the animal.

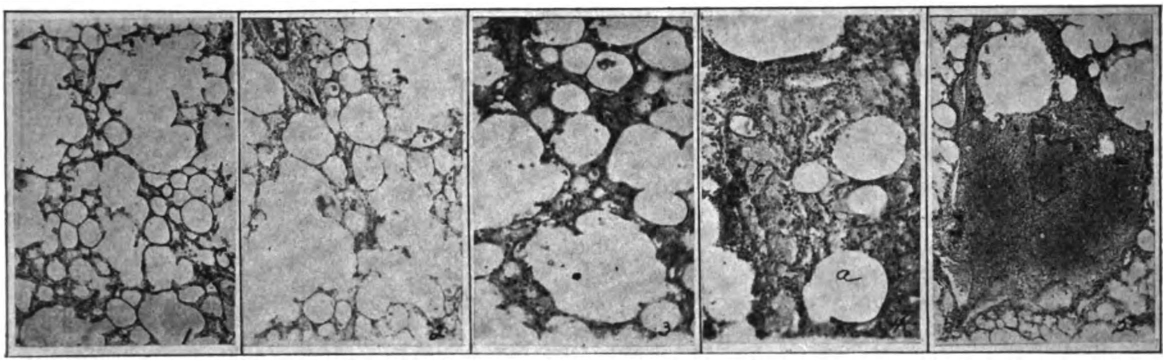
This method of anesthesia will not be accompanied by asphyxia if the catheter is of the proper size and the blood is well aerated. My experiments show that it does cause some damage to the alveoli of the lung. Severe shock and reflex disturbances are likely to follow this method of anesthesia if the pressure within the lung is maintained at a point higher than 25 to 30 millimeters.

Sauerbruch proved by animal experimentation that the breathing capacity can be reduced to one-tenth of normal without endangering the oxygen content of the blood. Spontaneous breathing should take place at all times during the anesthesia.

Seidel showed that there is a fall in blood pressure upon interrupting the pressure in the lungs. This fall in blood pressure was equalized so that it returned to normal before the cessation of the interruption. The pulse curve also showed some irregularity.

Robinson reported in 1913 that intratracheal anesthesia had been used in 1,402 cases with seven deaths. It is very useful in operations about the mouth, nose and throat as well as those within the chest, because blood and mucus cannot enter the glottis.

A series of pneumectomies were performed upon dogs at the Surgical Laboratory of the University of Michigan, using Meltzer's apparatus for intratracheal insufflation in order to determine whether there are any serious dangers connected with this method of anesthesia. The technic which was used in these operations was as follows: The field of



Case IX. Photomicrographs of sections of (1) unoperated lung, acute emphysema; (2) unoperated lung, acute emphysema, ruptured alveolar walls, congestion, areas of hemorrhage; (3) operated lung, *a*, emphysema, *b*, hemorrhage into alveoli, congestion and edema; (4) operated lung, acute emphysema, rupture of alveolar walls, congestion and edema; (5) operated lung, acute emphysema with rupture of alveolar walls.

operation was shaved on the day before the time set for operation. The dogs were given nothing to eat for twenty-four hours previous to the operation. A hypodermic of morphin gr. ¼ and atrophin gr. 1/150 was given one-half an hour before the beginning of the anesthesia. This dose was doubled in the case of the large sized dogs. After placing the animal upon the table the field of operation was scrubbed with a sterile brush and soap followed by sterile water, acetic acid and alcohol then sterile water again followed by a solution of bichloride of mercury 1-1000.

After the animal was completely anesthetized the catheter was introduced through the larynx into the trachea until it met an obstruction, then it was withdrawn about five centimeters and attached to the insufflation apparatus. The same aseptic technic was followed in these operations as is customary in any major operation upon man in a modern hospital.

The following are reports of those experiments of which the microphotographs of pathological pulmonary changes are presented:

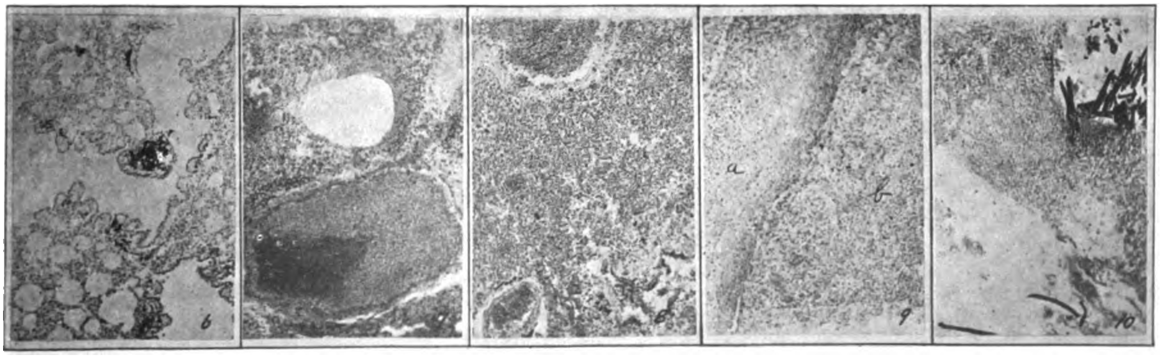
Case IX. Operation: Resection of one lobe of left lung. Result: Death in two days.

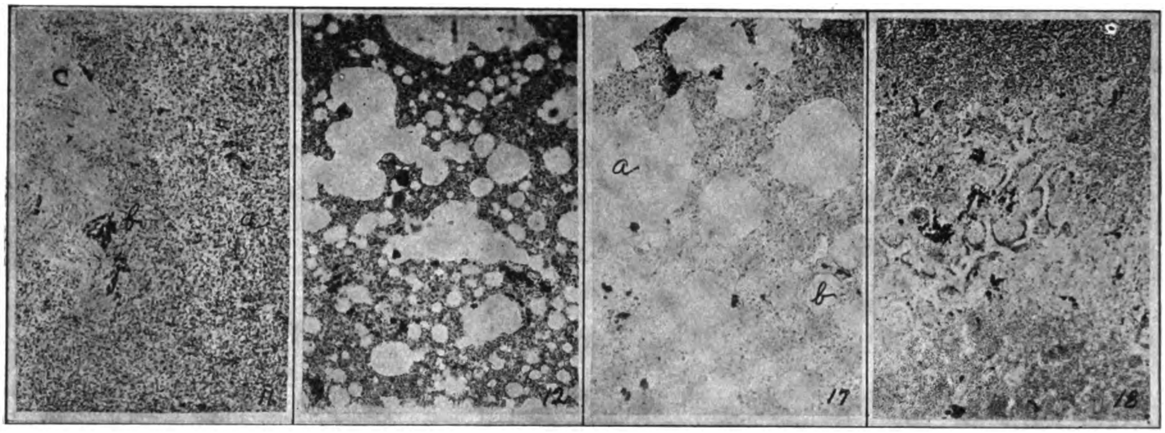
May 19, 1914, 8 P. M.—Miss Davis gave anesthetic. The same aseptic precautions as in any hospital surgical operation. Towel clamps applied. End of intratracheal catheter cut off so that it had a terminal instead of a lateral opening. Incision in seventh intercostal space. The distension of the lung was good, ribs retracted with mouth gag, lung grasped with rubber protected clamps and one lobe removed. The bronchi were ligated, cautery applied to wound and the lung carefully sutured. A drainage tube was introduced about two inches from the spine and only to edge of pleura. The air around the operated lung was aspirated with a small air pump and a rubber dam was applied over the tube and sutured into position. Aseptic dressings applied.

May 20.—Dog jumped out of box, dyspnea present.

May 21.—Dog died. Edema of all the tissues and fluid found in both pleural cavities. Tube was blocked with fibrin.

Case XIV. Photomicrographs of sections of (6) unoperated lung, some emphysema, anthracosis, marked dilitation of bronchioles; (7) unoperated lung, emphysema, congestion and anthracosis. Case XV. Photomicrographs of sections of (8) operated lung, nearly complete atelectasis, partial collapse of smaller bronchi, congestion; (9) operated lung, *a*, thick fibrino-purulent pleural exudate, *b*, collapsed lung; (10) operated lung, *a*, purulent pleural exudate, *b*, embodied stitches.





CASE XVII. Photomicrographs of sections of lung, (11) operated, *a*, atelectasis, *b*, anthracosis, *c*, scar tissue; (12) operated lung, some emphysematous areas and anthracosis. CASE XIX. Photomicrographs of sections of (17) operated lung, *a*, emphysema, *b*, hemorrhagic area; (18) atelactasis, collapse of bronchi, congestion, hemorrhage and anthracosis.

"Postmortem examination shows acute emphysema, rupture of the alveolar walls, congestion and edema. The large tear appears to be postmortem," Warthin. I had inserted the catheter into the trachea and insufflated with the bellows to see how much pressure the lungs would stand without rupturing. No rupture was noticed on the surface of the lung. A moderate distension, therefore, is all the lungs will stand during insufflation without the lungs being so badly damaged internally that the patient cannot recover.

CASE XIV. Operation: Resection of one lobe of left lung. Result: Recovery.

December 29, 1914, 8 P. M.—Dog weighs 19.8 kilograms or 44 pounds. A number 24 French soft rubber catheter was used for intubating the larynx and trachea, and the pressure kept at 25 to 30 millimeters.

Operation performed by Drs. Hayes and Cattermole under strict aseptic precautions. A strip of the fascia lata was used to cover up the wound in the lung.

December 30.—Dog stands up in cage, respirations 40, pulse rapid. Bowels have moved

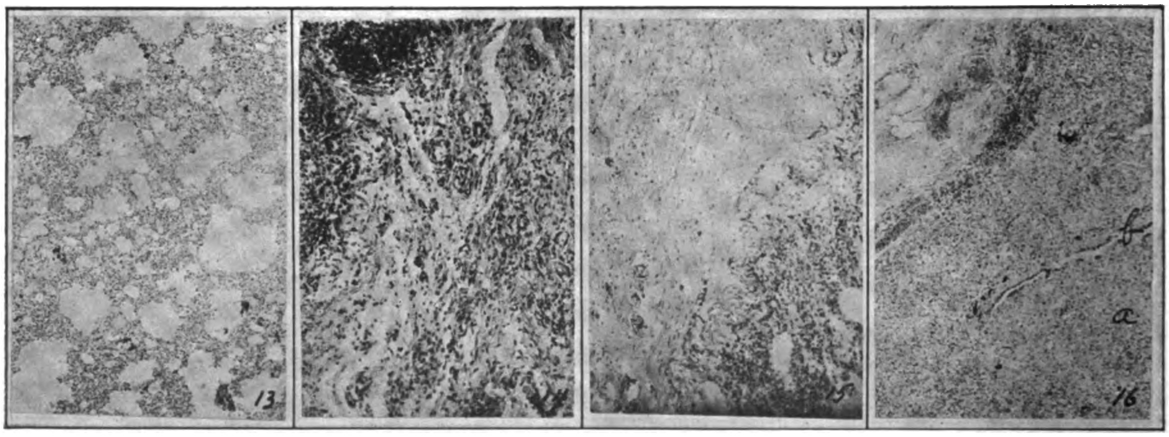
December 31.—Respirations 40, pulse 120-130; temperature 102.8 per rectum. Normal resonance on percussion over the entire lung.

January 1, 1915.—Respirations 40, pulse 130, temperature 102. Tympanitic resonance over entire left chest with crackling of subcutaneous tissues upon palpation. Normal resonance over right lung.

January 2.—Respirations 40, pulse 132 and temperature 101.5°. The dog gradually improved, and recovered from the operation, became very active, and barked very loudly so that he could be heard all over the medical building.

June 12.—Six months after operation the dog weighs 30 pounds or 13-7/10 kilos. This loss of weight may have been due to the confinement in

CASE XVIII. Photomicrographs of sections of (13) unoperated lung, congestion, anthracosis, some alveoli overdistended; (14) operated lung, subacute purulent inflammation, organizing fibrino-purulent pleuritis; (15) operated lung, subacute purulent inflammation, organizing fibrino-purulent pleuritis; dense fibrous connective tissue covering lung tissue; (16) operated lung, *a*, atelectasis, *b*, collapsed bronchus, *c*, scar tissue following operation.



the laboratory without exercise out of doors. The food was not as nourishing in character during the last month as it was during the rest of the year. Dog was killed with ether. There were numerous adhesions between the operated lung and the chest wall, also marked anthracosis of both lungs. The fascia lata was united with the pleura covering the lung. No fluid in either pleural cavity. The pathologic report from Dr. Weller upon the lungs is as follows:

"Unoperated lung, marked anthracosis, some emphysema, otherwise practically negative. Site of operation: a subacute purulent inflammation. Small abscess. Healing progressing rapidly about the abscess."

Case XVII. Operation: Resection of one lobe of left lung. Result: Recovery.

April 9, 1915.—Black and white male mongrel weighs 50 pounds. Number 24 French catheter passed into larynx and trachea after the dog was anesthetized. One rib resected subperiosteally. Pressure 25 to 30 millimeters. Resection of middle lobe of left lung, under the same aseptic precautions as are used in any major operation in a modern hospital. Several bronchioles ligated with silk and lung wounded sutured with mattress stitches of silk and a strip of fascia lata sutured over it. There was no leakage of air after the lung suturing was complete. External wound sutured in layers and sealed with gauze and collodion.

April 10.—Respirations 30, dog doing well.

June 12.—Two months after operation, dog weighs 32½ pounds or 14-7/10 kilos; looks emaciated probably because of poor food and confinement. Killed with ether. Some small adhesions between the operated lung and the chest wall and between neighboring lobes of the lung. Fascia lata united over the lung.

Pathologic report from Dr. Weller: "Unoperated lung: Practically normal. Some emphysematous areas. Seat of operation: Areas of atelectasis. Sutures still remain. No positive traces of fascia lata. Inflammatory process practically healed."

Case XVIII. Operation: Resection of one lobe of left lung. Result: Recovery.

April 19, 1915.—Small female dog weighs 22½ pounds. Number 21 French catheter passed into the larynx and trachea after the dog was anesthetized. Aseptic operation performed by Drs. Hayes and Cattermole. Resection of one rib subperiosteally. One lobe of the lung was removed and wound carefully sutured after ligating the bronchioles and vessels. The lung wound was covered with a portion of the fascia lata. External wound closed and sealed with gauze and collodin.

April 20.—Dog doing well and shows no bad symptoms.

June 12, 1915.—Weight is 16½ pounds, or 7-3/10 kilos, emaciated in appearance, probably from confinement and inferior character of the food during the last month. Wound healed with very little scar tissue. Killed with ether and lungs removed.

Pathologic report Dr. Weller: "Unoperated lung; congestion, anthracosis, some alveoli appear over distended. Operated lung: Sub-acute purulent inflammation. Embedded sutures. Organizing fibrinopurulent pleuritis."

SUMMARY OF THE NINETEEN EXPERIMENTAL CASES.

Case I. Pneumectomy. Recovery.

Case II. Pneumectomy. Death, 5th day. Empyema.

Case III. Pneumectomy. Death, 2nd day. Pneumothorax.

Case IV. Pneumectomy. Death, 30th day. Empyema.

Case V. Pneumectomy. Death, 3rd day. Pneumothorax.

Case VI. Pneumectomy. Death, 6th day. Pneumothorax.

Case VII. Pneumectomy. Death, on table. Paralysis of Glottis.

Case VIII. Pneumectomy. Death, 2nd day. Pneumothorax.

Case IX. Pneumectomy. Death, 2nd day. Over-pressure.

Case X. Pneumectomy. Death, on table. Pneumothorax.

Case XI. Pneumectomy. Death, 7th day. Over-pressure empyema.

Case XII. Pneumectomy. Death, 2nd day. Over-pressure and distemper.

Case XIII. Pneumectomy. Death, 3rd day. Distemper.

Case XIV. Pneumectomy. Recovery.

Case XV. Pneumectomy. Death, 6th day. Empyema and distemper.

Case XVI. Application of insufflation. Recovery.

Case XVII. Pneumectomy. Recovery.

Case XVIII. Pneumectomy. Recovery.

Case XIX. Pneumectomy. Death, 4th day. Over-pressure and distemper.

There were eighteen lung operations and four recoveries.

RECOVERIES.

Many of these experiments were failures because it was necessary to develop the technic by careful experimentation before successful surgery upon the lung could be done. An examination of these results will enable one to form an adequate idea of the difficulties that must be overcome in performing operations upon the lungs. As the majority of the dogs operated upon were afflicted with canine distemper the mortality is necessarily much higher than it would have been if healthy animals could have been obtained for this work. A careful study of these results warrants the following conclusions:

Intratracheal insufflation was not without harmful effects upon the lungs even in those dogs who recovered. Interstitial emphysema and over distension of some of the alveoli of the lung were shown microscopically. These changes were much more marked in those animals that died than in those that recovered and consisted of large hemorrhagic areas with tearing of the walls of the alveoli. Insufflation also has a very harmful effect upon the circulation in the lungs as is shown by the intense congestion and atelectasis found microscopically. In applying this method of anesthesia to intrathoracic operations upon the human being great care must be exercised in order to have the pressure high enough to prevent pneumothorax and still not so high as to cause serious damage to the circulation in the lungs or to cause a severe degree of interstitial emphysema.

The transplantation of a strip of fascia lata upon a wound of the lung gives an added protection to it from infection. Preliminary ligation of the bronchi and careful suture of the lung tissue must always be done. After the suturing is complete careful search must be made for the escape of air from the lung wound by moistening it with salt solution. If any air escapes the wound must be reenforced by additional suturing. For intratracheal insufflation a catheter of number 18 to 24 French should be used and the pressure should be maintained at 20 to 25 millimeters of mercury.

I desire to thank all those who assisted me in these experiments and especially Dr. Warthin for the examination of the pathologic material and the preparation of the photomicrographs which form a part of this article.

THE INTERSTATE ASSOCIATION OF ANESTHETISTS WILL MEET IN TOLEDO, OHIO, OCTOBER 9, 10, AND 11. THERE WILL BE A JOINT SESSION WITH THE MISSISSIPPI VALLEY MEDICAL ASSOCIATION AND A SPECIAL SECTION ON ANESTHESIA FOR ORAL SURGERY AND DENTISTRY.

THE NASAL ADMINISTRATION OF NITROUS OXID-OXYGEN ANESTHESIA UNDER LOW PRESSURE.*

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NEW YORK CITY.

It is not the purpose of this paper to trace the history of nitrous oxid as an anesthetic agent, nor to dwell upon the various theories concerning its action, as deduced from experimentation with lower animals. The parts played, in directing attention to this new use of *laughing gas*, by Dr. Colton, who, in 1867, reported 20,000 administrations of nitrous oxid, and by Dr. Wells, who foresaw the possibilities of this agent, are now matters of common knowledge.

It may be brought to mind, however, that these two pioneers employed nitrous oxid alone, thus inducing an asphyxial form of anesthesia. Dr. Andrews, in 1868, was one of the first to report the use of nitrous oxid in combination with oxygen, thus obtaining a non-asphyxial, and consequently a safer and more satisfactory form of anesthesia. With the addition of ether this form of anesthesia is now used in over 80 per cent. of all surgical operations, whereas nitrous oxid and oxygen is considered the ideal anesthetic in minor surgery.

DANGERS OF ADMINISTERING NITROUS OXID ALONE.

According to Gwathmy, experimental observations have established the fact that nitrous oxid, when given alone, induces asphyxia by the gradual paralysis of the respiratory center. In consequence of the prolonged action of the increasingly deoxygenated or venous blood, the respirations, at first rapid and deep, become convulsive as the process of deoxygenation is continued, then slow and shallow, finally ceasing altogether. Nitrous oxid, therefore, causes death by asphyxia.

With an increasing knowledge of the physiological action of the gas and with a clearer understanding of the dangers involved, the use of nitrous oxid alone has been practically abandoned. It is now generally employed in combination with air or oxygen.

ADVANTAGES OF ADMINISTERING NITROUS OXID WITH OXYGEN.

It has been found from experience, re-enforced by animal experimentation that certain advantages are derived from the administration of nitrous oxid with oxygen. These are:

(1) The anesthesia is non-asphyxial, safer, deeper, and more satisfactory in every way than when nitrous oxid is given alone.

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* Read before the New Society of Anesthetists at the meeting of May 2, 1917, with cinematographic demonstration.

(2) The anesthesia can be maintained for an indefinite period of time, without danger to the patient, and without embarrassment to the operator, especially when a nasal inhaler is properly empoyed.

APPARATUS FOR ADMINISTERING NITROUS OXID WITH OXYGEN.

For short oral operations, such as the extraction of a single tooth, or the opening of an abscess, the face mask has its place; but for longer operations, such as the extraction of a number of teeth, or the handling of the various anomalies which the dental surgeon encounters, a nasal inhaler is now considered an absolute necessity. Considerable thought, therefore, has been devoted to the matter of devising an apparatus which meets all the requirements, not only with regard to the inhaler *per se,* but as to the apparatus as a whole. What are these requirements?

(1) There must be an absolutely regular flow of each gas, at any rate desired, without the necessity of frequent valve or stop-cock manipulation.

(2) The flow of gases must be rendered visible, so that these proportions may be approximately estimated at a glance.

(3) An efficient method must be available for adding ether vapor gradually, yet rapidly, up to any amount that even an extreme case may require.

(4) The nasal piece must be so modified as to be absolutely air-tight, and also practically self-retaining. Let us consider for a moment, each of these requirements.

First: *Regular Flow of Gases.* The percentage of oxygen need give the operator no concern. The patient is the guide. The proportion of oxygen has been estimated at anywhere from 5 to 10 per cent. Conditions must govern the increase or decrease of the gases. Once the rate of each is determined, the regular flow must be maintained. This is the crucial point.

To obtain an even flow of nitrous oxid and oxygen from the liquid form, where the larger cylinders, that is, those containing 1,280 gallons of nitrous oxid and 400 gallons of oxygen are used, automatic reducing valves are necessary. For general use, however, cylinders containing 250 gallons of nitrous oxid and 75 gallons of oxygen are more practical. These are attached directly to the apparatus, not requiring reducing valves.

Second: *Visible Control.* The apparatus must be so constructed as to render the rate of flow or percentage of the gases visible, so that the relative proportion of each gas may be estimated at a glance. This assures the operator that the flow is actually taking place. This has been solved by having each gas bubble pass separately through equal parts of glycerine and water, into a glass mixing chamber. The volume of gases delivered to the patient is controlled by a fine needle-valve adjustment, acting against the low pressure delivered by the reducing valve. The important factor is to determine the proportion of nitrous oxid and oxygen suitable to the individual patient. Practice is the only sure teacher and guide, but after several administrations, and by close observation, by being able to recognize the various symptoms, and by paying attention to the proper adjustment of the nasal inhaler, the valves can be so regulated as to maintain normally *pink* anesthesia.

Third: *Method of Adding Ether.* The ether attachment for our routine is seldom used. In extreme cases I occasionally give a little ether with the nitrous oxid and oxygen.

Fourth: *Air-tight Nasal Piece.* Some years ago Dr. Teter improved the technic of nasal anesthesia when he devised a method of using oxygen with warm nitrous oxid by means of his nasal inhaler. I have never seen a metallic or a rubber inhaler that could be considered universal, that is, one that could be adapted to fit any nose without a slight leakage of air, thereby failing to give a perfect anesthesia. I tried one of these metalic inhalers with an aperture and an extended rim, so that gauze could be packed in to fill out the various anatomical structures, thus fitting the various size noses with which I was confronted. I came to the conclusions that for perfect adaptation a nasal inhaler must be constructed of soft rubber. I therefore proceeded to devise the one which I shall present presently. It is absolutely air-tight, it is self-retaining, it can be used for an indefinite period, it can be boiled and sterilized, it costs very little, and it can readily be replaced.

I may call to mind, in this connection, the objectionable features of the exclusive use of the face-mask. They are apparent to all. The middle or index finger of the right hand must be held over the controlling valve, and the left hand over the nose and mouth of the patient to insure perfect adaptation. Very often, during anesthesia, the patient displaces the mouth-prop, rigidity sets in, and you have to wait until the anesthesia becomes shallow before you are able to force the jaws apart and to replace the prop. Now you either extract one or more teeth, or you again apply the inhaler and proceed to reanesthetize the patient. During the operation the mouth becomes filled with congested blood, the field of operation is obstructed, the patient becomes cyanotic; you endeavor the swab out the blood and saliva, and you try to remove the remaining teeth in a very short period of time. You invariably lacerate and do other uncalled-for injuries to the gums or other structures. No other thought enters the mind but to *get out the teeth.*

With nasal anesthesia, on the other hand, the inhaler being self-retained, both hands are free, you watch your patient, you see the prop, you can pack the throat with gauze, you can take your time; you can extract one tooth or more, and you can swab out the mouth or the sockets if necessary.

Now let us assume, that the respirations become shallow, the patient breathing through the mouth, or worse, holding his breath. This is a very important factor. In such event, stop the anesthesia, or lift the inhaler from the nose, for with the next inhalation the great pressure may cause muscular spasm, respiratory failure, and often serious results. If the patient struggles, or holds his breath, and then inspires deeply, the extra amount of gas brought to the heart suddenly may paralyze it. The danger of such an accumulation of gas at a time when it is not wanted, or when it would be risky for the patient, is practically impossible, with outfit presented.

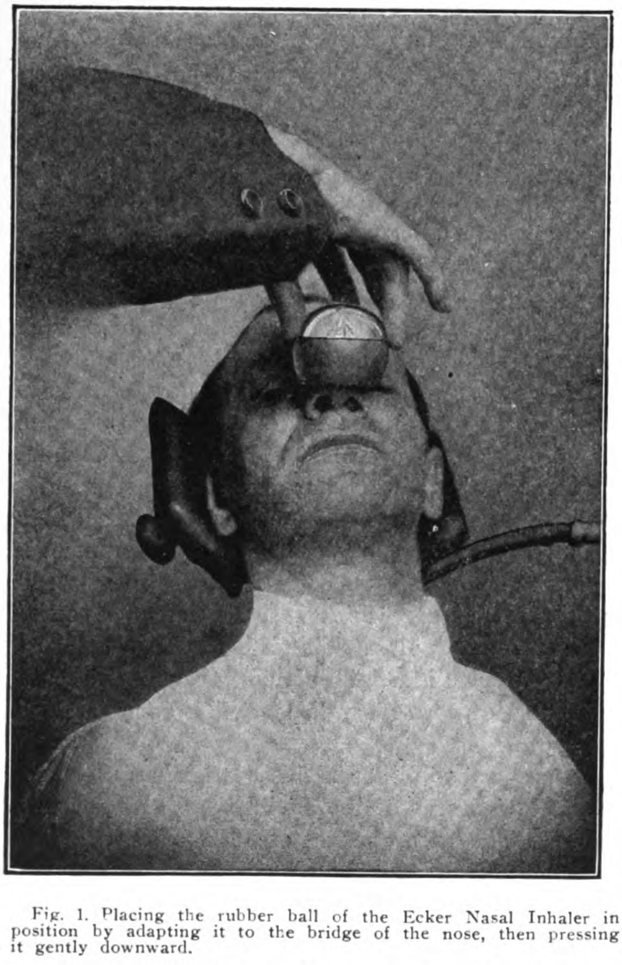

Fig. 1. Placing the rubber ball of the Ecker Nasal Inhaler in position by adapting it to the bridge of the nose, then pressing it gently downward.

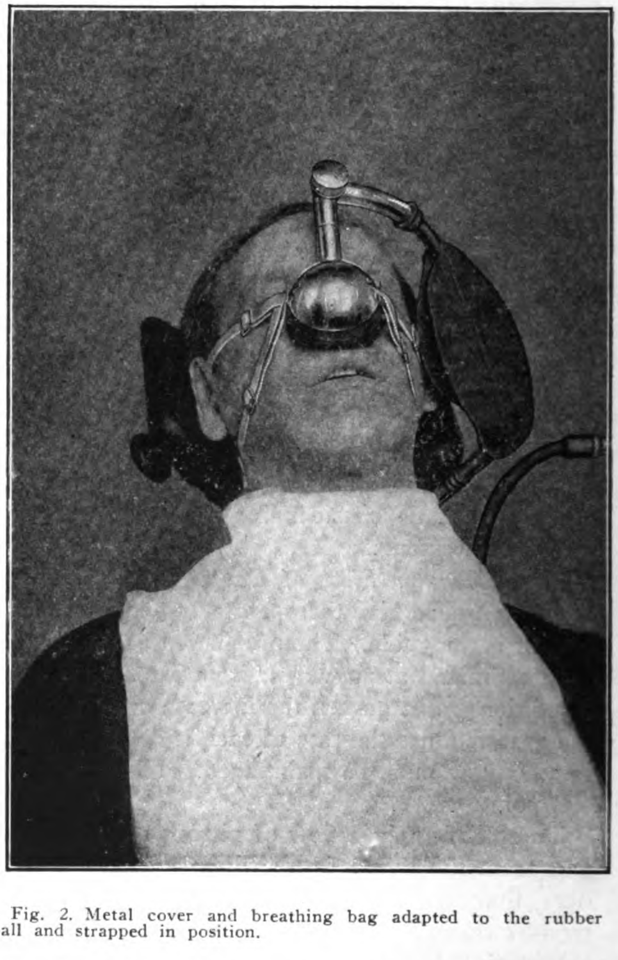

Fig. 2. Metal cover and breathing bag adapted to the rubber ball and strapped in position.

Granting that the dentist who administers a general anesthetic, is able to recognize the symptoms of respiratory and cardiac failure; admitting that the best results are obtained when he is able to work with comfort and leisure; which means that he need not worry about the patient getting too much of the anesthetic or coming out of the anesthetic state before the work is done—what apparatus or combinations thereof, best meet these requirements?

It is my opinion that one of the principle reasons for my success is the low pressure with which the Gwathmey apparatus and my nasal inhaler permit me to work.

The opinion that nasal anesthesia with the mouth open requires high pressure, and with it large volumes of gas and oxygen, is quite prevalent. But I can say that I am doing under low pressure, and consequently with small amounts of gas, just as well, even better than I formerly did with high pressure. I believe that in this difference between the two methods may be found the clue to the solution of the technical problem, that is, a proof that it is not essential or right to us high pressure for nasal anesthesia.

From a series of tests with a mercury gauge attached on the gas outlet of the sight feed, that is, directly in the gas channel to the patient, the pressure used did not exceed 10 millimeters, and was, on the average, below 5 millimeters. I can furthermore state that the average of gas used is 2 to 4 gallons per minute. This is easily determined, since sight feed holes are of standard guage, and the amounts passing through each hole are steady, without fluctuations, if the gas valve is heated. I now average about 5 to 7 gallons of nitrous oxid to an administration. Formerly, with high pressure, I averaged 10 to 12 gallons of nitrous oxid to an administration.

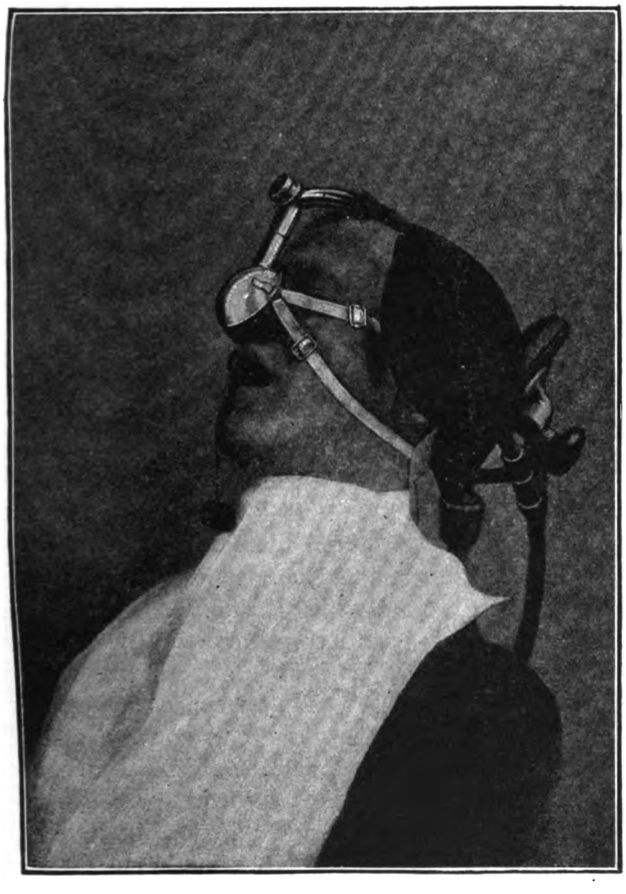

Fig. 3. Side view of the inhaler in position.

Why is it that I succeed, with *small amounts of gases under low pressure,* rarely with forcing, in obtaining a perfect nasal anesthesia? And when I say perfect, I mean an anesthesia which enables me to extract, with the greatest ease, and without fear that the patient will come out too soon, a mouth full of teeth, if this is necessary. My answer is that, in working *without leak and with a minimum loss,* through the mouth, by using low pressure: I am giving the patient no more than he can take. In short, as I have said before, with my nasal inhaler the danger of accumulation of gas at a time when it is not wanted, and when it would be risky for the patient, is practically impossible.

DESCRIPTION OF THE ECKER NASAL INHALER.

The Ecker nasal inhaler consists of a spherical rubber piece, a round cap metal holder with hooks for attachment of straps; an angular or straight nose nipple, with an expiratory valve; a small breathing bag, and rubber tubing leading to the apparatus.

It is as simple and compact as possible, and offers, with its rounded symmetrical surface, absolutely no obstruction to the operator's hand.

In conjunction with an apparatus delivering the gases at low pressures this inhaler consumes extraordinary small quantities of the anesthetic and produces results.

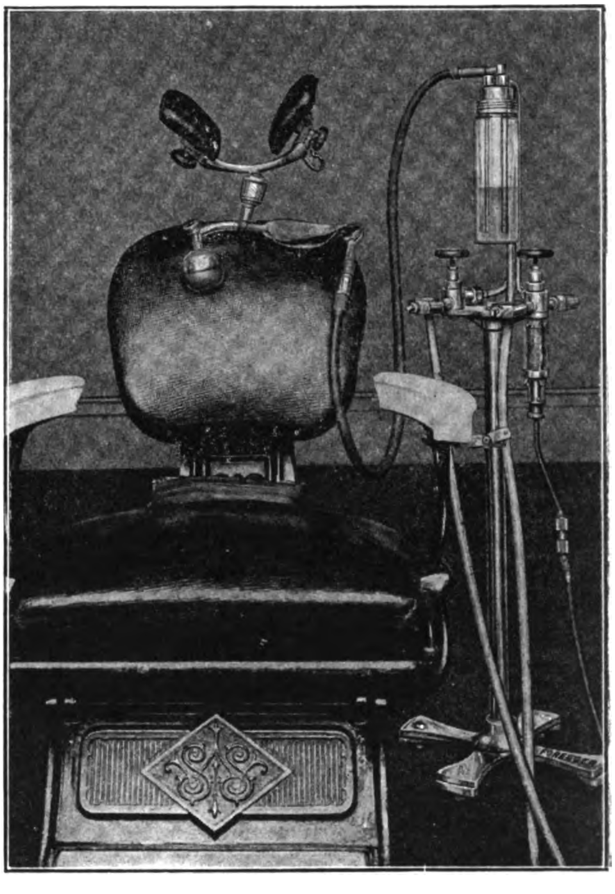

Fig. 4. Author's arrangement of apparatus and sight feed adapted for dental anesthesia and analgesia.

From the foregoing description you will now understand that in order to prevent the accumulation of gas when the patient stops breathing, and, conversely, to prevent the onrush of too large a volume of the mixture when the patient starts to breathe, it is not necessary to remove the inhaler. The accumulation of gas in the small rubber tube amounts to nothing, and the contents of the little breathing bag can be pressed out with one hand in one motion when the expiratory valve is open. If the occasion arises, I can shut off the gas-control valve, press out the mixture from the bag, and eventually let the oxygen run. A fresh supply of the mixture, whenever the time comes, is immediately obtained, eventually in different proportion with less nitrous oxid and more oxygen.

The smaller the amounts of gas and oxygen that you have to control, the better. Emptying the bag, refilling under different proportions, and setting a new mixture, is accomplished with this apparatus as quickly as it is spoken. The control is perfect.

I often get the patient under with gas only, or with a very small addition of oxygen. Whether I use gas through the fourth or fifth hole, or through the bottom of the tube, I will know immediately when watching the depth of the patient's rebreathing, as indicated by the small breathing bag. If I start with the fourth hole, and find that the patient empties the breathing bag, I go over to the fifth hole or to the bottom. *The rule should be that the breathing bag at the patient's expiration is nearly, but not quite, distended.* If the fourth hole keeps the bag nearly extended and the patient breathes normally, there is no reason to increase. On the other hand, if distension is full, and if the patient is a nose breather, it may be good to decrease the gas-flow to the third hole. whereby again you should consider that by such rebreathing there will be no carbon dioxid, consequently the patient will stand more oxygen without the risk of coming to.

The small breathing bag attached close to the nasal inhaler is a wonderful indicator of the patient's breathing. If you are able to draw conclusions from the character of the breathing you will be able to utilize the rythmic motions of the breathing bag as a guide for quickly obtaining and easily maintaining the proportions of the anesthetic mixture. I wish again to emphasize that this breathing bag and the visible gas flow through the sight feed place you in a position to master the situation from beginning to end.

In conclusion I desire to draw especial attention to the following points, observance of which will enable you to obtain a better and a safer anesthesia:

(1) Do not forget to use the rebreathing bag occasionally, for the rebreathing of the expired carbon dioxid acts as a respiratory stimulant.

(2) Do not cause much, if any, cyanosis in inducing anesthesia.

(3) Do not be in too great a hurry in bringing the patient under the influence of the anesthetic. Take your time, thus giving the system an opportunity to accustom itself to the anesthetic agents.

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LARYNGECTOMY UNDER NERVE BLOCKING.*

MALCOLM L. HARRIS, M.D.,
CHICAGO, ILL.

The case which we wish to show this morning presents the following history, omitting unessential details: F. K., age forty-seven. He has been feeling poorly for the past six months, during which time he has complained of a sore throat, cough, and difficulty in swallowing. He has had a mucopurulent sputum, streaked with blood, which has become quite profuse of late. For the past month he has been unable to swallow without great pain, and about three weeks ago he lost his voice, so that now he can speak only in a whisper. His appetite is poor and he has vomited after eating several times recently. He says he has lost about 60 pounds in weight. His general appearance is bad, he is poorly nourished, shows a great loss of weight, and his muscles are flabby. The important part of the physical examination, so far as we are now concerned, relates to the larynx. This is found to be filled with a nodular ulcerated mass. The right vocal cord is entirely destroyed and the left one paralyzed. The mass so fills the larynx as to cause a marked stenosis. There are a few palpable, enlarged, hard lymph-glands on either side, particularly the left, in the upper anterior triangle of the neck.

A diagnosis of advanced carcinoma is unmistakable, but notwithstanding the advanced stage of the disease and the poor general condition of the patient, the stenosis is so marked and the dyspnea so intense that an operation is imperative in order that he may have relief. A simple tracheotomy would give relief so far as the dyspnea is concerned, but we feel that the patient should be given a chance at least for that greater relief which may come from a more radical operation, and this, too, in spite of the fact that a few of the neighboring lymph-glands are already involved. We are also led to the major rather than the minor operation for the further reason that a complete laryngectomy is but little more difficult than a proper tracheotomy. Exception may be taken to this last statement by many who have done laryngectomy by the older method with general anesthesia, and we will agree perfectly with anyone that a complete laryngectomy, done with all the annoyances, difficulties, and dangers of the usual general anesthesia, is a very trying as well as a serious operation, but under nerve blocking the operation is robbed of most of its difficulties and becomes quite simple.

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* From the Surgical Department of the Alexian Brothers Hospital, by courtesy of the Surgical Clinics of Chicago.

Under nerve blocking the operator is freed from the annoyances inevitably connected with the anesthetist and his apparatus, the tracheotomy tube, and other inconveniences, and can proceed with the operation with a perfectly free field. The nerve supply of the anterior region of the neck is well adapted to nerve blocking, and almost all operations involving this region can be performed by this method with great satisfaction. To block this region the needle is inserted just behind the middle of the posterior border of the sternomastoid muscle. The external jugular vein usually crosses this muscle at about that point, so that the needle usually enters just above and behind the point of crossing on the vein and the posterior border of the muscle, but the vein varies somewhat at times, so that it alone is not a reliable guide. The vein, however, should be identified before inserting the needle, so as not to puncture it and thus inject the solution into the vein. The point of the needle should lie just beneath the deep fascia in immediate proximity to the branches of the superficial cervical plexus. Solution used:

Novocain, ½ per cent............3 parts
Calcium chlorid, 2 per cent......1 part
Magnesium chlorid, 2 per cent...½ part

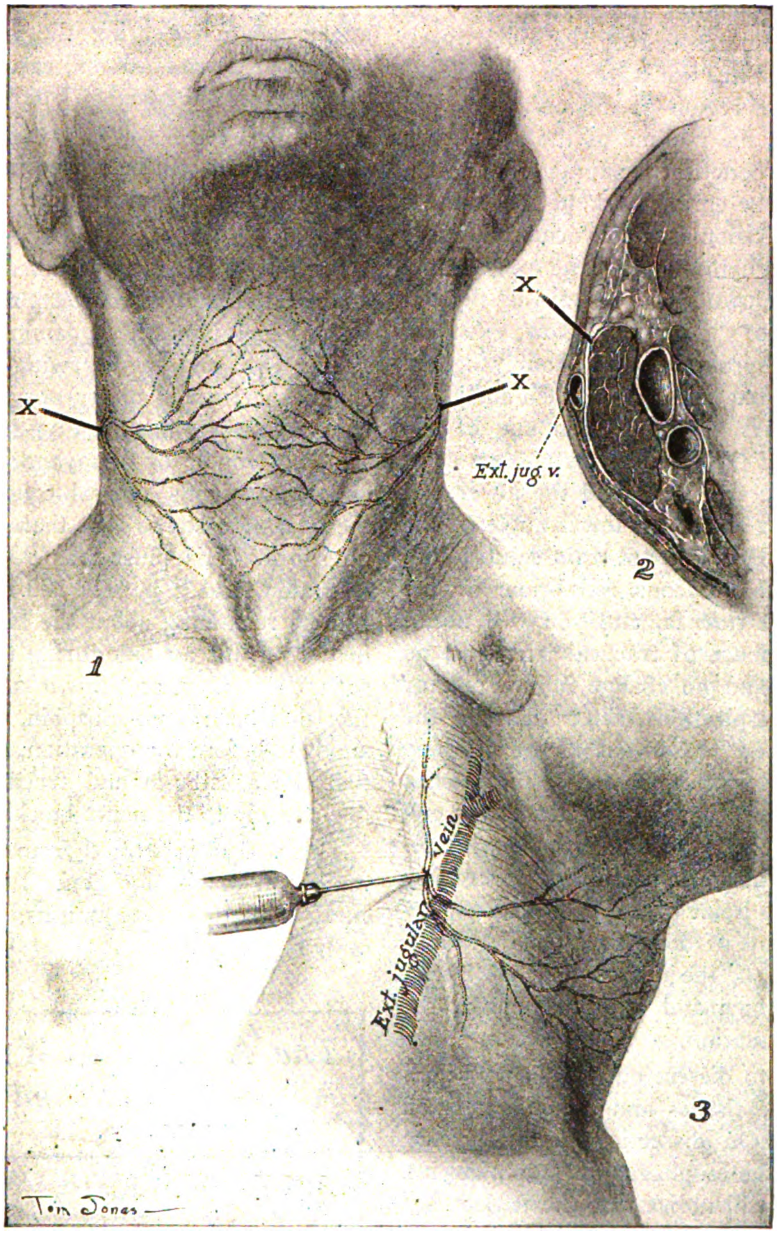

Fig. 1. 1 and 3 show the distribution of the nerve supply of the neck and the point at which the needle is inserted for the injection of the anesthetic. In 2 the position of the injecting needle and the anatomic relations are shown in cross-section. (Courtesy of W. B. Saunders Company).

Mixed at the time of using, and to which about 6 drops of 1:1000 adrenalin solution are added, just before using, to 60 c.c. of solution.

The needle being now inserted, as shown in figure 1, 25 c.c. of the novocain-calcium-magnesium solution are injected on either side of the neck; 10 c.c. of the same solution are next injected on either side, near the outer end of the hyoid bone. In less than five minutes we have a complete anesthesia of the entire region of the neck. An incision is made along the midline of the neck from just above the hyoid bone to the suprasternal notch, and, on account of the enlarged glands on the left side, a transverse incision is made near the upper end parallel with the hyoid bone. The longitudinal incision is carried down at once to the thyroid cartilage above and to the trachea below, exposing the isthmus of the thyroid, which is doubly ligated and divided and the lateral halves pushed aside. A loop of strong silk is passed around one of the cartilaginous rings of the trachea, the trachea completely divided above that ring, and the lower end of the trachea drawn out at the lower angle of the wound. A few drops of the novocain solution are now injected into the mucous membrane of the proximal end of the trachea, and you will notice that there is no evidence of tracheal irritation, no tendency to cough, and no change in the rate or character of the respirations after treating the trachea in this manner. By means of the silk loop about the ring of the trachea the end of the trachea can be easily drawn forward out of the lower end of the wound so there is no interference with respiration. The advantage of not being bothered by the anesthetist at this point of the operation is very apparent. On account of the dissection of the upper anterior triangle of the neck, which we intend to make, we turn down and out skin-flaps at the upper angle of the incision.

We now proceed to dissect out the larynx completely, including the tissues and lymph-glands on either side above. On dissecting posteriorly we reach the region of the esophagus and the pharynx, and up to now you will notice that the patient has given no evidence whatsoever that he has suffered the slightest pain, but on cutting the wall of the pharynx he moves his hand as an indication that it hurts. This we would expect, as we are now in a region not supplied by the cervical plexus, but by the glossopharyngeal nerve, so we will now inject a few drops of novocain solution along the wall of the pharynx so as to block this region. In doing this we should be careful not to block the pneumogastric nerves. Having made this injection, we proceed with the dissection, and the patient gives no further evidence of pain. The larynx is now completely removed, including the epiglottis and the surrounding tissues. Fortunately, we are able to close off the pharynx in front, which we do with catgut. A drain is placed in the upper end of the wound and the skin closed down through the lower angle, where we bring the proximal end of the trachea to the surface and carefully suture it to the skin, leaving the opening free without the introduction of a tracheal tube.

The patient will be placed in bed and allowed to sit up at once, and will be fed for a few days through a tube.

Anyone who has undertaken, or even witnessed, an operation for the complete removal of the larynx under general anesthesia cannot fail to be impressed by the ease and facility with which the operation can be performed under nerve blocking. As you have seen, there has been no difficulty with respiration, no trouble or annoyance with the anesthetic, and the patient's general condition at the end of the operation shows that there has been practically no shock. His pulse was 90 before starting the operation, and it is only 100 now, the quality and fulness remaining about the same. It is quite evident from his actions during the operation that he suffered no pain, and this, too, notwithstanding the fact that he had no morphin, scopolamin, or other anodyne before the operation, showing conclusively that the anesthesia and freedom from pain were due entirely to the nerve blocking.

This patient recovered from the operation, gained rapidly in weight and general health, and was very comfortable for some months, when internal metastases began to show.

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F. HOEFFER McMECHAN, A.M., M.D., *Editor*
Avon Lake, Ohio, U.S.A.

JULY EDITORIALS. **1917**

THE CALL TO THE COLORS.

Service in the field, in the base hospitals and with the Red Cross is no novelty to the anesthetists of the United States. Since the very beginning of the world war, many members of the various associations of anesthetists have been to the front, and now that the President has issued his call to the colors, there is no doubt that all anesthetists capable of so doing, will respond with alacrity.

To those whose one aim in their professional life is the alleviation of pain, neither the call of duty nor patriotism is necessary. Sufficient for them is the fact that their service is needed in the shambles of mercy behind the far-flung battle lines.

It is gruesome to know that the sheer lack of anesthetic drugs is compelling many surgeons to operate without the beneficence of anesthesia, especially in the field hospitals, and those, who on account of age or incapacity, must remain at home, should see to it that they and their friends provide the Red Cross with sufficient supplies of anesthetics to meet the existing demand.—McM.

THE NURSE ANESTHETIST DECISION IN KENTUCKY REVERSED.

As the Supplement goes to press comes the announcement that the Court of Appeals has reversed the decision in the nurse anesthetist case, rendered recently by Judge Kirby in the Circuit Court.

This reversal initiates a very deplorable situation with regard to the legal control of the practice of medicine in Kentucky, a state, which heretofore has been renowned for the protection it accorded its people in this respect. Undoubtedly the Kentucky State Medical Association, which declared the nurse anesthetist unethical and a menace to public safety, will see to it that the state legislature passes remedial legislation at the earliest possible moment.

Those who are proponents of the nurse anesthetist have the questionable consolation of knowing that while slavery has been abolished in the United States, they are attempting to initiate sweatshop conditions in the operating room. In this connection Amy Armour Smith, R.N., Superintendent of Nurses at the Woman's Hospital of the State of New York, in her recent volume, "The Operating Room," says: "A corporation should not make an ill-proportioned profit out of the services of any skilled employee. If a nurse anesthetist gives ten anesthetics per day at $10 each and receives a salary of $60 per month, she is exploited like a slave, and, worse still, she helps the system along."

It is interesting to note that the English Government in plunging women into the production of war munitions, did not have the temerity to exploit their labor, but has paid them the same salaries as men for similar work. This lesson in political economy should teach a striking lesson to those who are willing to betray the members of their own profession by underselling their expert service by exploited nurse anesthetists.—McM.

1917—MEETINGS—1917.

The Fifth Annual Meeting of the American Association of Anesthetists, held in New York City recently in conjunction with that of the A. M. A., was a success in every sense of the word. The papers of the scientific sessions were replete with experimental and clinical researches and the clinics held for the benefit of those in attendance, at the various New York and Brooklyn hospitals, demonstrated all the routine as well as the more advanced methods of anesthesia and analgesia. The Joint-Session with the A. M. A. Sections on Physio-Pathology and General and Abdominal Surgery went far to cement cordial relations and establish the conviction that anesthesia and the anesthetist deserve a more conspicuous part in the curriculum and clinic.

The Interstate Association of Anesthetists, despite war conditions, will hold its Third Annual Meeting in Toledo, O., October 9, 10 and 11, in conjunction with the Mississippi Valley Medical Association. An interesting and instructive program has been arranged. There will be a Joint-Session with the Mississippi Valley Medical Association as well as a Special Section of Anesthesia for Oral Surgery and Dentistry.

This will be one of the most important meetings in the Middle West this year and all those interested are cordially invited to attend.—McM.

Newer Apparatus

***Editor's Note**: From time to time this Department will publish Illustrations and Technical Details of the Newer Apparatus for Anesthesia and Analgesia.*

THE PNEUMATIC INJECTOR: A SUBSTITUTE FOR LOCAL ANESTHESIA SYRINGES.

R. E. FARR, M.D.
Minneapolis, Minn.

The pneumatic injector is designed to replace the syringe in making infiltrations for local anesthesia. In order to compete with general anesthesia, local anesthesia must be administered with greater speed and less labor than has been possible heretofore with the ordinary equipment. The elements of time and labor necessarily expended have heretofore deterred surgeons in many instances from employing local anesthesia, thus denying patients the great advantages of this excellent method of anesthesia. The pneumatic injector furnishes the surgeon an unlimited amount of the solution, a steady flow under constant pressure, and makes it possible to administer this anesthetic in the minimum time with the minimum output of labor. The constant flow under measured pressure gives one a uniform, even infiltration of the tissues, thus saturating them without tearing them apart as is often the case with a *jerky* syringe, and that most syringes are *jerky* all will agree.

Anyone who has had much experience in the use of local anesthesia knows that the shortcomings of syringes are manifold. They are difficult to keep in order, easily broken, if large, they are difficult to manipulate; if small, they must be refilled innumerable times in doing a major operation, this work often requiring the services of one or more extra nurses. Unless carefully constructed and kept perfectly clean, the pistons do not glide smoothly and do not allow the uniform infiltration of the tissues so essential to perfect anesthesia without trauma to the tissues. The introduction of any considerable amount of fluid is slow and exceedingly irksome to the surgeon. The time required by the operating room staff in sterilizing and assembling syringes, and in dissembling, cleansing and drying them after an operation is considerable when much local work is done. The multiplicity of syringes on the market is sufficient evidence that none is satisfactory. If much local anesthesia work is done, the item of expense on account of breakage is important.

The pneumatic injector (Fig. 1) consists of the following parts:

(A) A Prest-O-Lite tank such as is used for inflating automobile tires. The tap for this tank fits into the socket. (B) which is also designed to fit the tap of an ordinary oxygen tank. (An air pump may be used for this purpose.) (C) is a cotton filter. (D) is a safety valve. (E) is a pressure gauge. (F) is a wing nut which marks the point where the glass cylinders are detached from the filter tube. This wing-nut can be loosened and tightened by hand, thus obviating the necessity of special wrenches. (G) represents the removable tops or covers of the glass cylinders. (H) Eccentric levers by which the tops are securely closed. (I) is an exhaust valve, one of which is placed at the top of each cylinder. Through these the pressure may be reduced before opening the top for any purpose. (J) indicates the glass cylinders which are graduated into ounces and one-fourth ounces. The cylinders are marked *N* and *Q*, respectively, to represent Novocain and Quinin. The glass cylinders are one-fourth inch thick and are specially constructed to withstand pressure. (K) represents the valve through which the cylinders may be drained. (L) represents the valves through which the fluid passes to the tubing. The valves are so arranged that a solution may be directed from either of the glass cylinders through either of the flexible metal tubes, or both of them at the same time. The direction in which the valve is turned indicates the direction in which the fluid will flow. (M) represents the flexible metal tubing through which the fluid passes to the cut-off to which the needle is attached. (N) is the cut-off. It is equipped with a ball-and-socket joint and will accommodate either a screw or a record needle. The ball-and-socket joint allows one to turn the needle in any desired direction. The telescopic rod upon which the cut-off and flexible metal tubing are hung is removed at the end of each operation and resterilized with the tubing and cut-offs.

In order to sterilize the glass cylinders they may be detached at the point *F* and boiled or autoclaved. The cross bar *C* is a tube which is converted into a filter by lightly packing with absorbent cotton (Fig. 2). After sterilizing the cylinders they are attached to the filter by a wing-nut (Fig. 3). We formerly used a compressed air tank, which is exceedingly handy, but at the present time an ordinary pump (Fig. 4) is used as we consider it safer. When all joints are properly tightened, the pressure is maintained for a considerable length of time. The glass cylinders are filled through a sterile funnel (Fig. 5), the adrenalin solution having been previously added to the anesthesia solution which insures a good admixture of the adrenalin and the novocain. An exhaust valve has been placed at the top of each cylinder so that the pressure may be released before raising the covers. Provided cold solutions are not poured into the cylinders when cylinders are hot, there is no danger of breaking them. Once the cylinders are sterile they will, of course, remain sterile for a long time. After the first sterilization by boiling, they may be sterilized chemically from time to time if one so

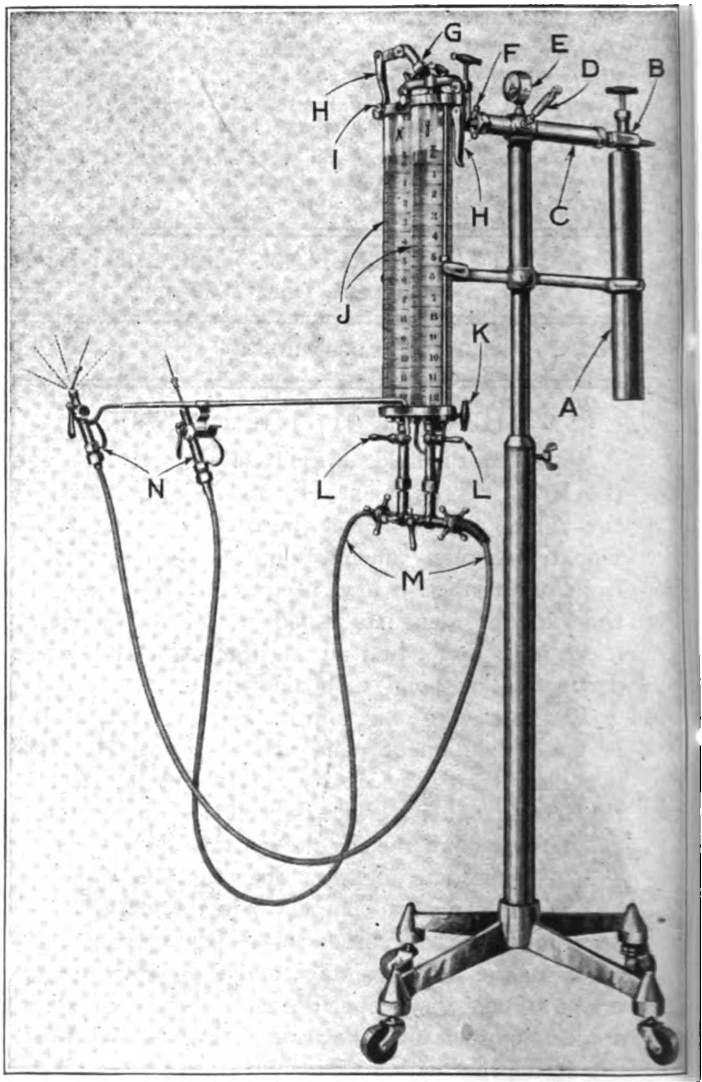
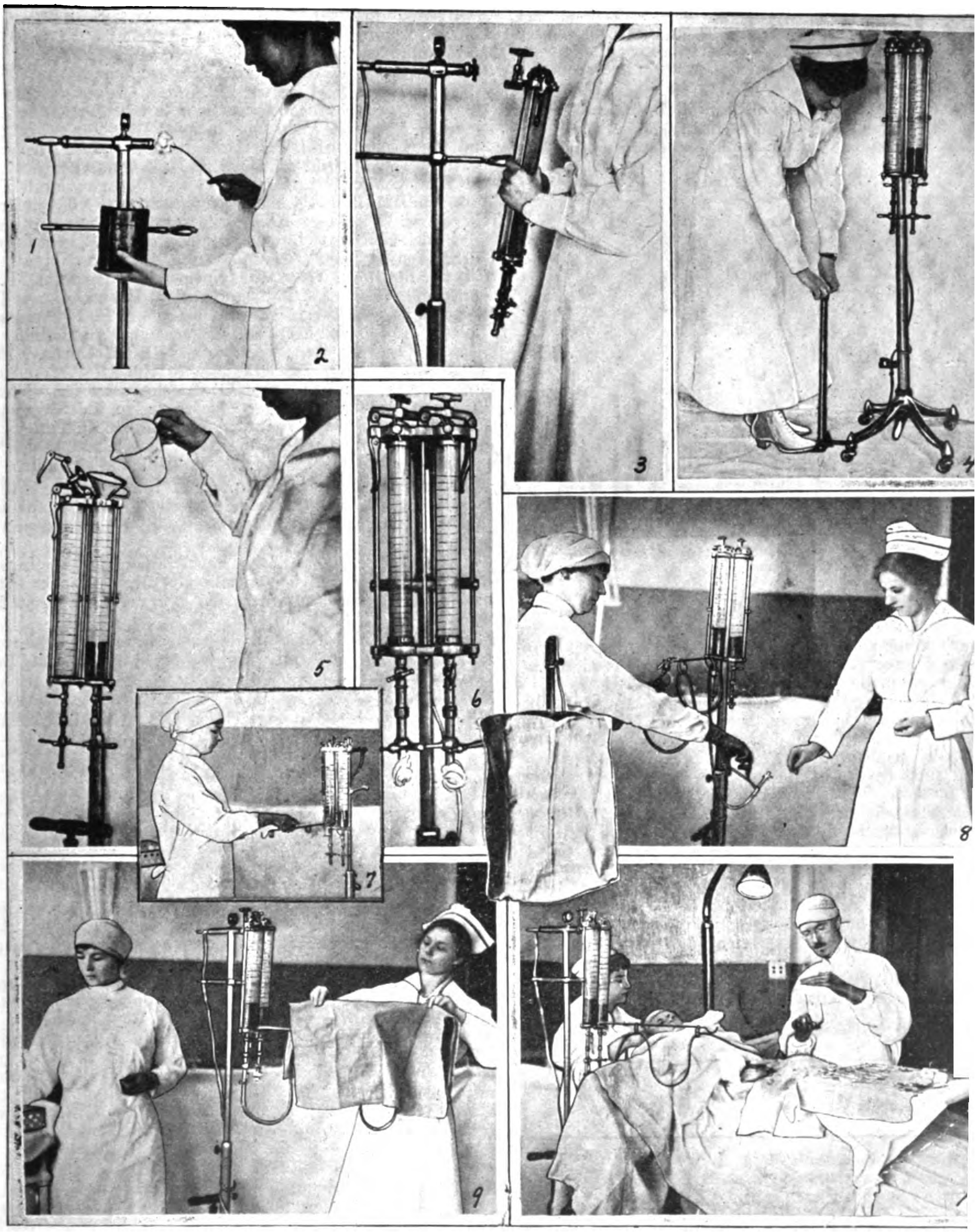


Fig. 1.

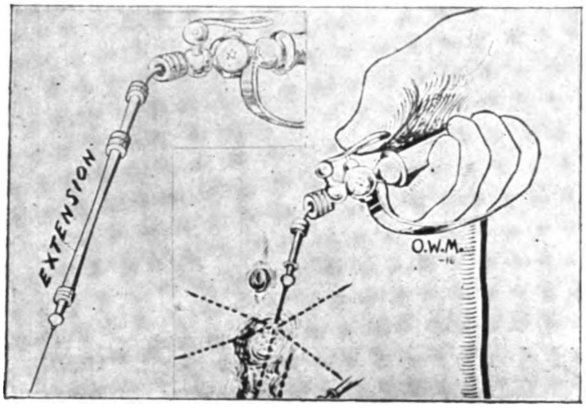
desires. With the instrument covered (Fig 6) the solutions may be allowed to remain in the cylinders for a considerable length of time. For each operation the preparation consists of sterilizing the metal arm (Fig. 7) and the flexible tubing and cut-off with the instruments. After scrubbing up, the instrument nurse places the metal support (Fig. 8) in its socket. She then takes the coiled flexible metal tubing in one hand and with a long artery forceps in the other hand passes this tubing to the anesthetist who attaches it to the apparatus by means of a wing nut (Fig. 8). If much time is to elapse between the setting-up of the apparatus and the performance of the operation, a sterile drape may be thrown over the tubing (Fig. 9). The anesthetist now arranges the *L* so as to direct the fluid through the tubing. being *set up* the apparatus stands near the instrumer After the draping of the patient the anesthetist mo apparatus into a convenient position. The enti of the surgeon's labor consists in allowing th escape from the tubing. When bubbles cease to needle is attached to the cut-off and the injection (Fig. 10). The cut-off is equipped with a univers so that *screw* or *record* needles may be used. The socket joint allows the needle to be directed a



Figures 2 to 10.

sires (Fig. 11). With the extension (Fig. 12) deep cavities may be supplied without any obstruction to the view. The cylinders have a capacity of from 10 to 16 ounces and are graduated in ounces and one-fourth ounces. One may therefore appreciate the rate at which the anesthetic is being introduced, the anesthetist calling off the number of drachms as the infiltration advances. Cylinders having a capacity of 2.5 oz., graduated into cubic containers have been designated for the use of dentists or nose and throat work where smaller quantities of the solution are required.

Asepsis. Repeated cultures show that the air passed through the cotton filter is sterile. The solution left in the glass cylinders are found by culture to be absolutely sterile in tests made after an interval of more than ten days.



Figs. 11 and 12.

An experience of five years with various models shows that the principle of the pneumatic injector is correct. In the author's clinic the apparatus has proved so satisfactory that syringes have been discarded entirely. Frequent inquiry has been made concerning the amount of pressure required. Naturally, this depends upon the nature of the tissue which is to be infiltrated, the size of the needle and the speed with which one desires to work. The loose tissues usually require not more than 20 pounds while scar tissue and such tissues as the uterine cervix may require 50 or 60 pounds. With moderate pressure and a rather fine needle the point of which is kept constantly moving, the anesthesia may be administered in less than five minutes in practically every case. As an adjunct to the armamentarium of the operating room, this apparatus has given great satisfaction aside from its use in the administration of local anesthesia. The injection of formalin-glycerin or other solutions where great pressure is required is made with the utmost ease. As an irrigator as well as in the introduction of hypodermoclysis one has always a sterile graduated pair of glass cylinders ready for any use for which they may be required.

PHYSICIANS AND SURGEONS BLDG.

Society Proceedings.

Membership in a society devoted to your specialty is an essential to success.

INTERSTATE ASSOCIATION OF ANESTHETISTS.

The Interstate Association of Anesthetists will hold its Third Annual Meeting in Toledo, Ohio, October 9, 10 and 11, 1917. This meeting will be in conjunction with that of the Mississippi Valley Medical Association, and a Joint-Session will be held. There will also be a Special Section on Anesthesia for Oral Surgery and Dentistry.

Among the papers and essayists on the program for this meeting may be mentioned the following: Methods of Teaching the Pharmacology of Anesthetics, Dennis E. Jackson, St. Louis; The Cytologic Analysis of Shock, D. H. Dolley, Columbia, Mo.; Further Researches in Blood Changes under Nitrous Oxid-Oxygen Anesthesia, Theodore D. Castro, Philadelphia; Liquid Air and Electrolytic Oxygen for Anesthetic Purposes, C. C. McLean, Dayton, O.; The Perfected Drop Method of Etherization and its Availability for Routine Surgery, Isabella C. Herb, Chicago; Ether and Etherization in Relation to Infections and Immunity, W. D. Haines, Cincinnati, O.; Nitrous Oxid-Oxygen Anesthesia and Analgesia in Obstetrics, C. E. Turner and W. I. Jones, Columbus, O.; Some Observations on Local Anesthesia for Certain Operative Procedures, Leigh F. Watson, Chicago, Ills.; Anesthesia for and the Technic of Direct Bronchoscopy, R. H. Johnston, Baltimore; Methods of Local and Conductive Anesthesia for Oral Surgery, Arthur E. Smith, Chicago; High Pressure Anesthesia for Cavity Preparation, W. T. Jackman, Cleveland, O.; Vapor Anesthesia for Oral Surgery, Joseph C. Beck, Chicago; Low Pressure Nitrous Oxid-Oxygen Anesthesia by Nasal Administration, M. Ecker, New York City; Anesthesia from the Surgeon's Viewpoint, F. G. DuBose, Selma, Ala.; Postoperative Pneumonia and its Relation to Anesthesia and other Causes, E. I. McKesson, Toledo, O.; Comparative Dangers and Availability of Nitrous Oxid-Oxygen Anesthesia, J. R. McCurday, Pittsburgh, Pa.; Vapor Anesthesia with Special Reference to the Use of Ether-Oxygen, Oral Administration, John J. Buettner, Syracuse, N. Y.; Anesthesia in the Surgery of Epileptics and the Treatment of Status Epilepticus, G. Kirby Collier, Sonyea, N. Y.; Some Observations on Postoperative Nephritis, Karl R. Ruddell, Indianapolis.

The sessions and exhibits of the Joint-Meeting will all be held in the Hotel Secor, as well as the Organization Dinner. The ladies in attendance will be entertained especially.

This will be one of the most important meetings in the Middle West this year and all surgeons, anesthetists and dentists who are interested are cordially invited to attend.

For further information, dinner reservations and membership apply to F. H. McMechan, M.D., Avon Lake, O., Secretary.

PROVIDENCE, R. I., SOCIETY OF ANESTHETISTS.

The annual meeting of the Providence, R. I., Society of Anesthetists was held in the New Medical Society Building on the evening of March 31, 1917.

Preceding the meeting, Dr. Paulel J. Flagg of New York City, the essayist of the occasion, was entertained at dinner by members of the society at the University Club.

During the meeting Dr. Flagg read a very interesting paper on "Intratracheal Insufflation Anesthesia."

After detailing the underlying physiological considerations connected with this method of anesthesia Dr. Flagg described the various phases of the technic of administration, especially the use of the Jackson laryngoscope for introducing the catheter and the advantages of the anesthetometer in providing an accurate, constant and tension-regulated flow of ether-vapor. Dr. Flagg emphasized the necessity of deep preliminary narcosis before attempting intubation, in order to avoid reflex spasm of the glottis and larynx. Complete extension of the head and direct vision of the glottis also facilitate intubation. Ordinarily a No. 24 French, silk woven urethral catheter with a side opening is the preferable one, although the size must be modified according to the individual. It should never be introduced beyond its 26 cm. mark and after introduction and touching the bifurcation of the trachea, it should be withdrawn about an inch. A hissing of the return flow of air is an indication that the tube is actually in the trachea and that it has not been inadvertently introduced into the esophagus.

Dr. Flagg considered a pressure of between 18-20 mm. of Hg. sufficient for all purposes, and preferred to have the pressure readable on a Hg. manometer rather than controlled by an automatic blow-off set for a fixed pressure.

To aid diffusion of the anesthetic vapor and facilitate respiratory movements of the lungs, the intratracheal tube is pinched two or four times a minute, while the reaction of the patient is carefully noted. Intratracheal insufflation obviates obstruction to respiration and delivers a constant vapor of sufficient concentration in a volume equal to all the respiratory needs of the patient. Acapnia may result from over-ventilation and is apt to occur following the withdrawal of the tube. After sickness is the exception and irritation of the vocal cords from friction of the tube seldom is noted.

The insufflation technic is indicated in all operations requiring the prevention of pneumo-thorax, and it has many advantages in all operations on the tongue, jaw, neck, trachea, larynx and the air passages or esophagus. It will also prevent suffocation from vomitus in intestinal obstructions.

Dr. Flagg's paper was discussed by several of the members.

The election resulted in the selection of Dr. Charles O. Cooke as President and Dr. E. S. Cameron as Secretary for the ensuing year.

E. S. Cameron, M. D., *Secretary.*
223 Congress Ave., Providence, R. I.

Book Reviews

A carefully selected library is essential to a thorough knowledge of the science and practice of a specialty.

Experimental Pharmacology. By Dennis E. Jackson, Ph.D., M.D., Associate Professor of Pharmacology, Washington University Medical School, St. Louis. Octavo, pp. 536, with 390 Original Illustrations, including 24 full-page Color Plates. C. V. Mosby Company, St. Louis, 1917.

The dearth of laboratory manuals giving exact, specific, detailed directions for carrying out most of the experiments which the student will be called upon to perform in the study of pharmacology, has led Jackson to prepare and publish his *Experimental Pharmacology.* This volume is of especial interest and importance to specialist in anesthesia, particularly those who are teaching the subject, since it deals with those drugs and anesthetic agents which are routinely employed by the anesthetist.

The experimental pharamcologic studies of ether, chloroform, nitrous oxid, ethyl chlorid and bromid, cocain, novocain, chloral hydrate, morphin, atropin, pituitrin, and other pertinent drugs are exhaustively detailed, and every step in the mechanism of experimentation precisely and fully illustrated.

The anesthetist who will master the experimental pharmacology indicated in this volume so that he can utilize it in teaching his classes in anesthesia, will find himself just that more of an accomplished expert and his teaching will redound to the benefit of the specialty he is pursuing. The volume attempts to inculcate the scientific spirit of research, so vital an incentive to success both in the teacher and student.

Jackson is to be congratulated not only on his interesting and instructive book, but also on his personal researches in the pharmacology of anesthesia, some of which are printed in this issue of the Supplement.

The Surgical Clinics of Chicago. Volume 1, No. 2, April, 1917. Octavo, pp. 223-448, with 99 illustrations, Paper Covers. Published Bi-Monthly. W. B. Saunders Company, Philadelphia.

This issue of the Clinics sustains the high standards of interest set in previous issues. The work of such important clinicians as Andrews, Beck, Bevan, Davis, Dyas, Eisendrath, Halstead, Harris, Kanavel, Ochsner, and Percy are included.

The publishers have announced the merging of the *Murphy Clinics* and the *Chicago Clinics* into a new publication that will be entitled *The Surgical Clinics of North America.* It will be issued quarterly, and will be devoted to the publication of the advanced medical and surgical progress in the clinics of New York, Philadelphia, Baltimore and Chicago. This enlarged scope should make the new *Clinics* all the more attractive to those subscribers who have found the others invaluable.

Quarterly Index
Of the Current Literature of Anesthesia and Analgesia.

Acidosis, Influence of on Surgical Procedures. W. A. Lincoln, Calgary Alberta. Annals of Surgery, February, 1917.

Anesthesia Acidosis, the Prophylaxis of. Wm. H. Morris, New Haven, Conn. Journal of the American Medical Association, May 12, 1917.

Anesthesia, Evolution of. W. H. Dodge, Hancock, Mich. Michigan State Medical Society Journal, April, 1917.

Anesthesia and Analgesia, Handling Emergencies Under. N. T. Yager, Louisville, Ky. Dental Summary, April, 1917.

Anesthesia. J. T. Riley, El Reno, Okla. Oklahoma State Medical Association Journal, March, 1917.

Anesthesia Under the Influence of Expulsion of Blood from the Region by a Tourniquet. N. Petroff. Russkiy Vratch, xv No. 44, 1916.

Anesthesia, General, Deep Reflexes in. L. Roncoroni. Policlinico, January 21, 1917.

Anesthesia, General, Approved Newer Methods of. R. C. Coburn, New York City. Medical Record, March 3, 1917.

Apparatus—A Simple Anesthetic Apparatus for Laboratory Use. Journal of the American Medical Association, May 26, 1917. F. McGrath, Milwaukee.

Apparatus—New Instrument for Attachment to Suction Apparatus to Maintain a Dry Field in Tonsillectomy Under General Anesthesia and to Lessen Occurrence of Postoperative Pneumonia. S. Israel, Houston, Texas. Laryngoscope, February, 1917.

Apparatus—New Anesthetic Shield. Isabella C. Herb, Chicago. Journal of the American Medical Association, March 3, 1917.

Apothesine, a New Local Anesthetic. Carroll W. Allen. New Orleans Medical and Surgical Journal, March, 1917.

Blood Changes Produced by Nitrous Oxid-Oxygen Anesthesia. Theodore D. Castro, Philadelphia. Dental Cosmos, April, 1917.

Blood Pressure, Interpretation of Certain Ratios. W. J. Stone, Toledo, O. American Journal of the Medical Sciences, February, 1917.

Blood Pressure, Relation of to Anesthesia. Mary V. Medigan, Portland, Oregon. Northwest Medicine, January, 1917.

Chloroform Anesthesia, Some Experiences with. L. Eliot, Washington, D. C. Washington Medical Annals, March, 1917.

Cocain Poisoning, Avoidance of in Local Anesthesia. J. Torrance Rough. Pennsylvania Medical Journal, January, 1917.

Dentine, Hypersensitive, Clinical Methods of Treating. Herman Prinz, Philadelphia. Dental Outlook, May, 1917.

Ether Hypnosis in Psychotherapy. F. R. Starkey, Detroit. Medical Record, April 14, 1917.

Ether-Oil Rectal Anesthesia, Technic of. W. Ray. Medical Journal of Australia, January 13, 1917.

Ether, Rectal Anesthesia by Means of Report of Cases J. B. M. Y. Florez, Columbia, S. A. Surgery, Gynecology and Obstetrics, March, 1917.

Ether Pneumonia, So-Called, Relation of to Pelvic and Abdominal Surgery. W. E. Darnell, Atlantic City, N. J. American Journal of Obstetrics, March, 1917.

Ether Solution, Use of for Autodisinfection of Wounds. A. Diasto and T. R. Bowen. British Medical Journal, February 17, 1917.

Heart Massage, Two Cases of Heart Failure in Operating Room, Treated by, Recovery. E. S. Molyneux. British Medical Journal, March 24, 1917.

Hemiplegia, Case of Occuring Immediately After Tonsillectomy Under General Anesthesia. W. A. Scruton, New York City. Laryngoscope, February, 1917.

Intratracheal Insufflation of Air for Intrathoracic Operations Under Differential Atmospheric Pressure. K. H. Giertz. Upsala Läkareforenings Förd-handlingar, xxii, Supplementary Number, 1917.

Intratracheal Insufflation, Italian Percursor of Meltzer, Auer and Baglivi, 1703. G. Bilancioni. Policlinico, February 4, xxiv, No. 6, 1917.

Local Anesthesia with Total Confinement of Three Days; Report of 51 Cases of Apendectomy Reduced to Ultra Simplicity; the Inguinal Canal as a Means of Access; a One Inch Incision and One Suture Closure. J. T. Nix, Jr. New Orleans Medical and Surgical Journal, April, 1917.

Local Anesthesia with Novocain-Adrenalin in Surgery. P. A. Petridis. Lyon Chirurgical, xiii, No. 6, 1916.

Local Anesthesia, Gastrojejunostomy Under, in Two-Stage Operation. D. Cheever, Boston Medical and Surgical Journal, May 3, 1917.

Local Anesthesia. F. G. Dyas, Chicago, Illinois Medical Journal, May, 1917.

Local Anesthesia, Removal of Varicose Veins of Leg With. Carroll W. Allen. New Orleans Medical and Surgical Journal, March, 1917.

Local Anesthesia, Prostatectomy Under, with Narcosis. W. R. Grove. Medical Journal of Australia, March 10, 1917.

Local Anesthesia, for Prostatectomy, Better Results with. P. Legueu. Journal d'Urologie, 1914-15-16, vi, No. 6.

Local Anesthesia, Suprapubic Prostatectomy Under. R. E. Farr, Minneapolis. Urologic and Cutaneous Review, April, 1917.

Local Anesthesia for Dentistry, a Comparative Study. Ramon Marti. Revista Dental, March, 1917.

Local Anesthesia, Study of. Dental Register, February, 1917.

Local Anesthetizers. E. E. Maddox, Bournemouth, England. Opthalmic Record, March, 1917.

Lung Abcess, Caused by Dental Mishaps Under Anesthesias: Report of Two Cases. T. O. Heatwole, Baltimore. Dental Cosmos, March, 1917.

Morphin, Atropin, Pituitrin and Ether in Obstetrics. J. F. Martin. Boston Medical and Surgical Journal, March 1, 1917.

Nerve Blocking for Operating on the Limbs. A. Jentzer. Revue Medicale de la Suisse Romande, November-December, xxxvi, No. 11-12, 1916.

Nerve Blocking, Laryngectomy Under, with Novocain-Calcium-Magnesium Solution. M. L. Harris, Chicago. Surgical Clinics of Chicago, April, 1917.

Nerve Blocking Between Two Tourniquets. R. Sievers. Archiv f. klinische Chirurgie, cvii, No. 4, 1916.

Nerve Blocking for Intractable Pain. F. G. Dyas. Chicago. Surgery, Gynecology and Obstetrics, April, 1917.

Nitrous Oxid-Oxygen Analgesia and Anesthesia. H. A. Tuckey, San Francisco. Dental Cosmos, April, 1917.

Nitrous Oxid-Oxygen Anesthesia, Operations Under in the Forward Inclined Sitting Posture, for Oral and Sinus Surgery. Dental Summary and Journal National Dental Association, February, 1917.

Nitrous Oxid-Oxygen Anesthesia in Major Surgery. A. J. Browning, Portland, Oregon. Northwest Medicine, February, 1917.

Novocain Local Anesthesia. W. B. Holden, Portland, Oregon. Northwest Medicine, February, 1917.

Oral Hygiene, Its Relation to Anesthesia and Analgesia and the Anesthetist. Bion R. East, Detroit. Dental Summary, February, 1917.

Oxygen, Therapeutic Administration of. J. S. Haldane, London. British Medical Journal, February 10, 1917.

Painless Labor, Morphin, Atropin and Pituitary Solution for. M. H. Vallenas. Cronica Medica. January, 1917.

Painless Labor, Problem of, Not Yet Satisfactorily Solved. J. A. Beruti. Semena Medica, xxiv, No. 1, 1917.

Painless Labor-Scopolamin and Morphin in. R. W. Johnson. The Practitioner, April, 1917.

Paraverterral Anesthesias Report of Fifty Cases. F. W. Konrad. Boston Medical and Surgical Journal, March 8, 1917.

Paravertebral Anesthesia with Scopolamin and Narcophins Shockless Surgery. A. R. Kimpton. Boston Medical and Surgical Journal, February 15, 1917.

Practical Methods of Anesthesia. J. T. Gwathmey, New York City. British Medical Journal, March 24, 1917.

Pressure Anesthesia, the Use of Isotonic Solutions for. Texas Dental Journal, March, 1917.

Shock, Fat Embolism as a Cause of. W. T. Porter, Boston. Boston Medical and Surgical Journal, February 15, 1917.

Shock, Surgical and Some Allied Conditions: Report of Medical Research Committee. British Medical Journal, March 24, 1917.

Soldiers, Methods of Anesthetizing. W. J. McCardie, Birmingham, England. British Medical Journal. April 14, 1917.

Spinal Anesthesia for Laparatomy. M. Suga. Sei-I-Kwai. Medical Journal, March, 1917.

Spinal Anesthesia, Conservation of Energy in; Its Value in Weakness of Cardiac Muscle. R. R. Huggins and B. Z. Caselman, Pittsburgh. American Journal of Obstetrics, March, 1917.

Stovaine, Pharmacology of. M. I. Smith and R. A. Hatcher. Journal of Pharmacology and Experimental Therapeutics, January, 1917.

Tooth Refilling, Amalgam, Aspirated into Lung During Extraction Under Anesthesia. Chevalier Jackson, Pittsburgh. Dental Cosmos, May, 1917.

Trigeminal Neuralgia and Anesthetization of the Gasserian Ganglion. F. F. Hartel. Muenchener medicinische Wochenscrift, January 2, lxiv, No. 1, 1917.

TO THE READERS OF THE SUPPLEMENT.

¶ A perusal of the announcements of apparatus, drugs and accessories in the Advertising Sections will amply repay those surgeons, dentists, specialists and anesthetists who, in their daily routine, are beset with the problems incident to handling operative risks under anesthesia and analgesia. —*Editor.*

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WOUND DIPHTHERIA.*

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The literature would indicate that a wound infection by the diphtheria bacillus is a rare occurence. I have found recorded, in all, less than fifty proven cases. The condition is, however, probably much more common than these reports indicate, since its nature is often unrecognized. Dawson[1] also expresses this belief. On the other hand, "it must be pointed out . . . that cases of wound infection are not common and that many of the membranous conditions following the infections of wounds have been proved by numerous observers to be due to other bacteria"[2] than the diphtheria bacillus.

Of 2,600 cases of diphtheria at Grove Hospital between 1902 and 1914, only 30, or 1.1%, showed cutaneous involvement.[3] At St. Anne's Children's Hospital, Vienna, in 2217 clinical and bacteriological cases of diphtheria (from 1894-1902) the skin was attacked in but 13 instances.[4]

It is variously stated (Knowles and Frescoln,[4] and Dawson[1]) that diphtheria of the skin was first recognized by Chomel in 1759 and by Samuel Bard in an epidemic in New York in 1771. In 1828, Trousseau published an extensive description of cutaneous diphtheria. According to him, it never develops unless the epidermis is broken. This is probably true, and cutaneous diphtheria is in reality, wound diphtheria. In this communication, however, I have in mind only diphtherial infections of gross and surgical wounds. It must be said that Daviot, as cited by Knowles and Frescoln does not hold the view of Trousseau and most other authors that a tissue loss is essential to cutaneous diphtheria infection; and Adler (cited by von Marschalko[5]) demonstrated that the uninjured skin of the guinea-pig can be thus infected, experimentally.

Such reports of instances of wound diphtheria as may have been published before the discovery of the bacillus by Klebs and Loeffler in 1883 and 1884, respectively, need hardly concern us, because various organisms may produce a membranous wound exudate simulating that of diphtheria. Only a positive bacteriological finding can establish the diagnosis beyond doubt, although in some of the recorded cases without laboratory investigation, the symptoms and sequellæ were indeed strongly suggestive. Neisser[6] published the first case bacteriologically proven in 1891. The first proven case of wound diphtheria that I have found in American literature was reported in 1897 by O'Connor[7] who found the Klebs-Loeffler bacillus in an ulcer developing upon an abrasion of the chin.

Various organisms are capable of producing a false membrane in an open wound:—staphylococci, streptococci, baccillus coli communis, baccillus pyocyaneus, and pseudo-diphtheria or diphtheroid baccilli. Some of these organisms may be found with the diphtheria bacillus. It is quite difficult, if not impossible, to differentiate by their appearance alone, membranes produced by these organisms from true diphtheria infections; and the more so since the latter vary much in color and other physical peculiarities.

It would appear that no variety of wound is immune to diphtheria infection. It may contaminate burns, bites, blisters, contusions, herpes, fissures, punctures, excoriations and operative wounds. It has often occurred in tracheotomy wounds as an extension from the throat. These I shall not consider here. Pitt[8] records a case of diphtheria of the umbilicus in a 14 days old infant. The Klebs-Loeffler bacillus has been found in the pus of a closed abcess. There are several recorded instances of post-partum diphtheria of the parturient canal.

Case I. Stella M., age 10 months, admitted to the third surgical service (Dr. Elsberg) April 13, Operated upon the next day for pyarthrosis of the right hip. Postero-external incision with counter-incision in the groin. The temperature fell gradually from 104° at the time of operation, and after the fourth day it ranged between 99° and 100° until April 25th, when it rose to 103.8° falling again to 100-101° when imperfect drainage was corrected. The discharge gradually diminished and the wound granulated satisfactorily. On May 1st, it was noted that there was necrosis of the wound edges and deep fascia. At this time the temperature range was 101°-101.8°. May 5th: an exudate was found about the wound edges and in the depth the granulations were pale and flabby. The child was listless. The wound edges were curretted and the wound was irrigated with potassium permanganate solution. Staphylococcus aureus was found in the currettings. Temperature, 101°-102°. May 6th: Condition poor; wound appears distinctly necrotic; it has a yellow coating and an offensive odor, much like that of a dead mouse. Dr. Brickner, of the Attending Staff, made a diagnosis of wound diphtheria and ordered antitoxin injections, cultures and isolation. May 7th: Temperature, 103°-104.2°. Laboratory reported Klebs-Loeffler bacilli. May 9th: died.

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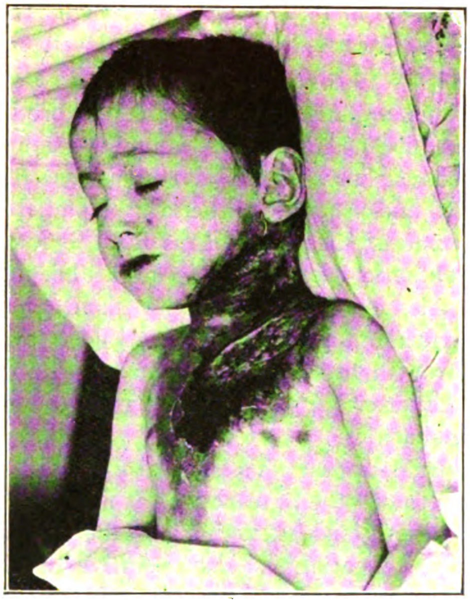
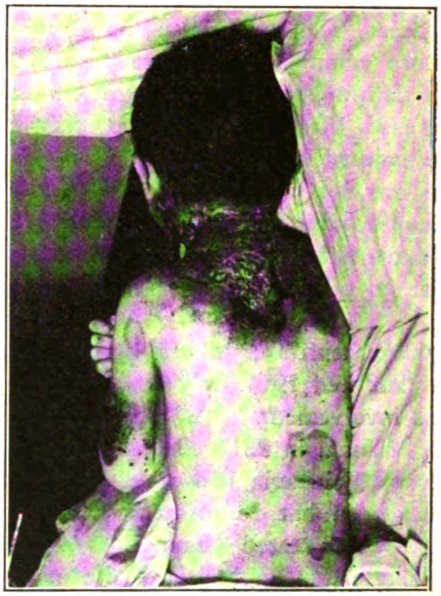
* From the 3d Surgical Service, Mount Sinai Hospital.

Case II. Morris T., age 4 years. Admitted to the third surgical service (Dr. Moschcowitz) June 10, 1916, with a fresh, extensive second degree burn of the left side of the neck, extending down on upper chest anteriorly and posteriorly, and the left arm and scattered areas on the back, produced by hot soup. The child was well nourished and not very sick on admission. The temperature declined from 102° on the first day to 99° on the seventh day. On the tenth day, it was noted that all the burns were granulating satisfactorily. The temperature was normal and the child was running about the ward. June 28th: Temperature has gradually risen to 101.6° June 30th: The entire wound of neck and left shoulder is covered with a dense, whitish exuberant membrane; temperature, 102°. July 2nd, the exudate appears yellowish, temperature, 100°-101°. July 4th: The entire neck and shoulder wound is extensively gangrenous. Its color is distinctly green. The gangrene extends as a black area to the adjacent unburned skin. (See photographs.) The wound is fetid but not suppurating and there is now no membrane. The child is cold. The pulse is very feeble. Dr. Brickner diagnosed wound diphtheria and ordered 5,000 units of antitoxin, cultures from wound, nose and throat, and isolation. Bleeding from nose and mouth, vomiting. Died. Klebs-Loeffler bacillus found in cultures from the wound and the throat, but not from the nose. Throat diphtheria developed on the same day in two other children in the same ward.



Case II. Extensive gangrenous diphtheria of a large granulating burn.

Case III. Benjamin B, age 4 years. Readmitted to third surgical service (Dr. Moschcowitz) April 28, 1917 for recurrence of retrobulbar sarcoma of right orbit, removed 2 months before. May 1st: Operation by Dr. Moschcowitz. Radical removal of all the orbital tissues, including the periosteum. May 8th: Lid sutures removed. Wound clean, repacked with iodoformized gauze. Temperature not above 100°. May 15th: Orbit granulating satisfactorily. Child has been walking about. May 18th: Child awoke during the night, crying out with pain in the right side of the head. Vomited. Drowsy during the day. Temperature, 100.4°-99.5°. Yellow membrane in orbit. May 19th: Cultures from the wound show Klebs-Loeffler bacilli. 5,000 units of antitoxin administered. A few hours after its administration, the child vomited several times and had a left-sided convulsion with slow, shallow respiration. Temperature rising rapidly from 99.4°-103°; pulse (previously 80-116), 140-180. The child made a good recovery, but at this writing, 5 weeks from the onset, diphtheria bacilli are still recoverable from the wound.



Case II. Extensive gangrenous diphtheria of a large granulating burn.

There had been no diphtheria in this ward for a long time, but the ward on the floor immediately below had been isolated on account of diphtheria a short time before this case developed.

Wound diphtheria occurs in adults as well as in children. It affords no typical picture. The wound may present a dull, whitish, grayish or yellowish surface or give the appearance rather of being necrotic, and gangrene may develop, as in case 2. A distinct membrane is sometimes recognizable, and its removal produces bleeding. The Klebs-Loeffler bacilli are recoverable from the membrane.

These wounds frequently discharge an ichorous pus, i. e., a bloody serous, or grayish brown fluid (Holm[9], O'Connor[7], Dawson[1], and Tavel[10]). There may be an offensive, "stale", "mousy" or "fetid" odor, or no odor. The wound is apt to be tender, painful and surrounded by an area of infiltration (Dawson[1], Evans[11], Züllig[12], Brunner as cited by Züllig, Burfeld[13], Bristol[14], Von Marschalko[5], Baginski and Adler as cited by Von Marschalko, and Pitt[8]). The neighboring lymph glands are only sometimes involved.

At the outset, there may be no general reaction; attention is first called to the changed appearance of the wound, not to the general condition. In a short time, however, there usually develop severe constitutional symptoms: fever, rapid pulse, marked prostration, vomiting and, often, death in a few days.

Trousseau, as cited by Bolton and Brewer[15], says: "The wound first becomes painful and 'a colourless fetid serosity' escapes, and a thick grayish flabby membrane appears on the surface. The edges of the wound are swollen and violet red in color. The disease does not usually extend but remains stationary for months. When the epidermis alone is removed, the raw surface becomes covered with a white membrane, and a reddening like that of erysipelas soon develops around it. On the surface of the latter, the epidermis is elevated in many points by small masses of 'lactescent serosity.' The vesicles thus formed run together and burst, the exposed dermis being then covered with a white membrane. These new centers join to the main center and to each other and so the disease spreads. The invasion generally takes place from the superposed parts toward the dependent parts, this probably being due to the irritation of the serous secretion. . . . When the disease extends rapidly the fever may be very acute, but it is usually like the hectic fever accompanying suppuration. The patient died after the manner of those suffering from malignant diphtheria."

Experimentally, Adler (as cited by von Marschalko) also describes a clinical picture which is inclusive of most of the characteristics mentioned above. He says, "The clinical picture shows a surrounding area of hard infiltration, red, like erysipelas. There are points of inflammation, which become confluent. The edges of these points are irregular, abrupt. They are yellowish or grayish white. Sometimes dirty, greenish necrotic areas are seen. If separation of the membrane is attempted, the base appears very red and bleeding. In the neighborhood of these there is marked edema. The surrounding lymph modes are inflamed but not tender. He took 19 cases which in no way correspond to this clinical picture and could find the Klebs-Loeffler bacilli in any."

Primary wound diphtheria is that form where there is no mucous membrane involved, while the term secondary wound diphtheria denotes a primarily involved mucous membrane with secondary involvement of the wound. It must be borne in mind, however, that Barrus[16] has shown that the Klebs-Loeffler bacillus may be found in the noses and throats of from 1% to 3% of healthy individuals. Schottmuller and Seitz have also found them (quoted by Züllig). There may be said to be three modes of infection: (1) Auto-inoculation (secondary diphtheria) (2) From another person, who may be a physician, as in Bumm's and in other cases described by Züllig[12]. This person may infect by contact or as a carrier. Those afflicted with wound diphtheria may very readily act as carriers themselves. (3) From infected objects. Abel found the diphtheria bacillus on toys months after. They have also been found on the shoes and hair of nurses and on hair brushes of patients. Wright and Emerson found them in the dust of diphtheria hospitals. Park found them in clothes of patients, and Howard found them in milk.

The histological picture is so variously and opposingly described that I have come to the conclusion that Frankel draws, that one cannot distinguish a true diphtheritic infection from a non-diphtheritic infection by the histology alone.

Various treatments are made mention of. However, all writers hold that the use of von Behring's serum is of prime importance for it is variously stated that wound diphtheria can produce constitutional symptoms, complications and sequellæ like those of nose or throat diphtheria. (Bristol[14], Burfeld[13], Baginski and von Marschalko[5], Weekly Bulletin, Department of Health, N. Y. C.[17]). Locally, Tuohy[18] made use of Bier's hyperemia, irrigations and poultices. Burfeld[13] used mercury biniodide 1:500. Randal Herley[19] scraped the infection, which looked like an anthrax pustule, and applied pure phenol. Holm[9] cleansed his own wound with a ten percent solution of formalin and closed it with celloidin. Bristol[14] used various antiseptics and states that staphylococcus and lactic acid bacilli sprays have been used. He used a live lactic acid bacillus spray several times each day, avoiding the use of antiseptics at this time. Locally, Adler used wet compresses of 1:1000 bichloride of mercury. After cleaning, he applied a two percent. boric acid ointment. Züllig irrigated with one percent. bichloride of mercury and inserted iodoform gauze into the wound. Brunner (as cited by Züllig) disinfected with iodoform powder and applied a dry dressing. Bertelli applied the antitoxin locally with good results.

It may be mentioned that another characteristic of wound diphtheria is that in those who recover there is a tendency to chronicity of the lesion, during which time it is usually possible to isolate the organism from the wound. This is well represented in case 3.

It is the chief purpose of this communication to emphasize the great importance of watching for possible diphtheria infection of wounds in all hospital surgical wards. There may be any of the above-mentioned sources of infection. *Any unusual, atypical change in the appearance of a surgical wound should at once arouse one to the possibility of a diphtheritic infection* and *a reasonable suspicion should demand vigorous treatment.* A gray, yellow, white or necrotic appearance in a previously healthy wound, particularly if the wound presents other of the above-mentioned findings, should lead one to take a culture, isolate at once, and administer antitoxin in large doses without waiting for laboratory confirmation. The mortality is high, and the chance of recovery decreases with the length of time that elapses before the diagnosis is made. When constitutional symptoms have become marked, it may be too late to save the patient.

I wish to express my gratitude to Dr. Walter M. Brickner for his kindness in suggesting and directing this study, and also to thank Dr. Leopold Brahdy of the House Staff of Mt. Sinai Hospital for assisting me in translations of the foreign literature. I am indebted to Drs. A. V. Moschcowitz and C. A. Elsberg for permission to cite the cases.

200 BEVERLY ROAD.

BIBLIOGRAPHY.

1. Dawson, G. W.: Cutaneous Diphtheria. British Medical Journal, 1910, ii, 859.
2. Graham Smith, G. S.: Nuttall and Graham-Smith's "Bacteriology of Diphtheria." Cambridge University Press, England, 1908, p. 376.
3. Rolliston, J. D.: Diphtheritic Whitlow. British Journal of Dermatology, 1916, xxviii, 110-114.
4. Knowles, F. C., and Frescoln, L. D.: Diphtheria of the Skin of Unusual Types. Journal of the A. M. A., 1914, lxii, No. 5, 398.
5. von Marschalko, T.: Ueber Hautdiphtherie, Archiv für Dermatologie und Syphilis. 1909, xciv, p. 379.
6. Neisser, E.: Ein Fall von Hautdiphtherie. Deutche Med. Wochenschrift, 1891, p. 703.
7. O'Connor, B.: Diphtheritic Inflammation in a Wound of the Chin. Brooklyn Medical Journal, 1897, xi, p. 204-206.
8. Pitts, B.: Diphtheria of the Umbilicus. Lancet, 1897, p. 953.
9. Holm, M. L.: Accidental Laboratory Infection with Diphtheria Bacilli. Journal of the A. M. A., 1909, ii, p. 698.
10. Tavel: Ueber Wunddiphtherie. Deutsche Zeitschrift für Chirurgie, 1901. Bd. 60, s. 460-468.
11. Evans, Edward: Diphtheria in Surgical practice. Wisconsin Medical Journal, 1909-1910, viii, p. 637.
12. Züllig, J.: Wunddiphtherie und Wunddiphtheroid. Beiträge zur Klinischen Chirurgie. 1912-1913, lxxxii, p. 531-595.
13. Burfeld, J.: Two cases of Diphtheritic Infection of Operation Wounds. St. Bartholomew's Hospital Reports. London, 1905, xli, p. 233-236.
14. Bristol, L. D.: Wound and Skin Diphtheria as a Public Health Problem. American Journal of Public Health, N. Y., 1915, v., p. 838-842.
15. Bolton, C., and Brewer, D.: A Case of Extensive Cutaneous Diphtheria with an Examination of the Nervous System. Lancet, 1905, i., p. 1130.
16. Barrus, Harry A.: Prophylaxis of Post-Operative Diphtheria. Boston Medical and Surgical Journal, 1907, clvi, p. 705-712.
17. Weekly Bulletin, Department of Health, N. Y. City, 1917, vi, p. 117.
18. Tuohy, E. L.: Two Unusual Cases of Diphtheria Involvement or Contamination of Wounds. Journal of Minnesota Medical Association, 1909, xxix, p. 201.
19. Herley, Randal: A Case of Wound Diphtheria. Lancet, 1909, i, p. 1830.
20. Bertelli, G.: Sulla difterite cutanea. Gazzeta Degli Ospedali, 1914. xxxv, p. 3035.

SEPTIC TEETH: THEIR ETIOLOGY AND SURGICAL TREATMENT.[1]

JOSEF NOVITZKY, D. D. S.
SAN FRANCISCO.

Much pseudo-professional advice is being recommended for the correction of various septic dental disorders termed "pyorrhea." Teeth that are hopelessly necrotic, thoroughly septic, dead in every sense of the word, are said to be affected by "pyorrhea." Due to the lack of experience, knowledge, and study of pathological symptoms, healthy as well as unhealthy states of the dental joint are said to be the results of "pyorrhea." The use of the term would excite merriment, if we could forget the misguided patients.

"Pyorrhea" is not a disease distinctive in itself. The term "pyorrhea" should be regarded as an obsolete one.[2]

Now, before we can intelligently diagnose septic infiltrations of teeth and their supporting structures or differentiate those infiltrations amenable to conservative treatment and those not amenable to such treatment, we must consider the underlying causes of the septic infiltrations.

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[1] Presented before the Surgical Section of the San Francisco County Medical Society, January 16, 1917.

[2] "Pyorrhea" is used in this paper, because of the general usage of the term. This term should be restricted to inflamed or suppurative conditions of vital tooth joints. Traumatic or septic gingivitis, with or without pericemental detachment, would probably be a more appropriate term. Advanced types complicated by absorption and fibrous degeneration of the alveolar process should be so designated when making the examination. The term pyorrhea meaning a "flow of pus" would be less explicit than the use of "heart disease" as a means of diagnostic expression in pathological conditions of the heart structure.

WHAT CONSTITUTES A "PYORRHEA."

Traumatic, septic gingivitis, with or without detachment and infection of the pericemental fibers of a vital tooth, would be a clinical representation of what is commonly understood as "pyorrhea." Acute or chronic inflammation or suppuration of the tooth joint, immediately below the gingival margin of a vital tooth root, the affected area not communicating with the apical region or with the mouth, would be considered a "pyorrhea," probably of embolic origin. The acute type would be distinguished by the typical characteristics accompanying acute suppuration; while, the earlier stages of the chronic type would usually escape notice. Roentgen-ray examination of the earlier stages, however, will show absorption of the alveolar process; also the gums will appear thicker than the normal and resemble a fibrous hypertrophy.

In chronic cases there will be kept up a low grade inflammation probably maintained by serumal deposits on the tooth roots, the result of exudation of blood fluids and corpuscles through the vessel walls. Pathological tissue changes may result in an acute termination. This usually follows gingival detachment. The prognosis of this type is unfavorable, because of the uncertainty of locating the foci or original cause of the trouble; and also because of the extensive destruction of alveolar walls and pericemental structure.

The gingival margin, ordinarily, may be considered as the common location of a beginning "pyorrhea." This may be due to septic embolism; but it is usually due to thrombosed bloodvessels, the result of local irritation or trauma. The cyanosed, swollen, relaxed gingiva provides opportunity for retention of food and septic substances. This retention ultimately assists in bringing about gingival and pericemental detachment. The forces of mastication from now on, assist in the destruction that follows. Many infections of the dento-alveolar joints of vital teeth have been observed to improve and disappear after the operation of a necrossed antrum floor, or the removal of dead teeth and carious alveolar process. In fact, the condition of the entire mouth and often times of the tonsils has been apparently permanently improved, by such removal of dead structure. Now, whether the gingival suppurations are reflections of the other septic disturbances by proximity of septic drainage, or whether the complications are due to a metastatic complication probably brought about directly by the blood circulation, it would not always be possible to say, with any considerable accuracy.

Hartzell, one of the workers appointed by the National Dental Association, claims that proximity of suppuration allows pathogenic organisms to penetrate through the gingival ring, into the dento-alveolar joint of normal teeth; and he cites his experiment of blowing oxygen gas under the gingival margin, demonstrating that the gas penetrates into the socket.[3] He believes that if oxygen gas penetrates, bacteria will also; and to him this explains why he finds streptococcus viridans in the apical region of normal teeth. Hartzell further states that hematogenous infection of the dento-alveolar socket could not emanate from a suppurating tonsil, because tonsillar infections are invariably of a hemolytic strain; a strain that, according to Hartzell and Henrici, is rarely found in a pathological tooth socket. Hartzell apparently believes that a septic tonsil would be apt to cause dental suppurations by direct continuity of tissue. This certainly would be correct in many instances.

Many of the grave general septicemias that have been traced to tooth, tonsil or nasal infection, will show a septic gingival margin of all teeth, from which pus can be obtained. This condition may or may not be associated with gingival or pericemental detachment. Pus, pus producing, and other organisms, certainly do not penetrate into the dental sockets in most cases. The normal unrelaxed gingival ligament seems to prevent penetration. The sticky mucous secretion may possibly also have an inhibitory effect on bacterial migration. The average penetration through the gingival ring, however, does not take place until the parts become relaxed, or until trauma assists in the penetration.

If Hartzell were correct in believing that all socket infection took place by means of penetration of pathogenic bacteria, through normal unrelaxed gingival ligaments, we should expect to see acute "pyorrhea" in all intensely septic mouth cases.

Extremely septic mouths are more or less bathed with pus. If a diagnosis of "pyorrhea" is made and meddlesome poking and scratching at the root surface is undertaken, infection of the dental socket follows, with possible irreparable damage to the tooth and tooth joint.

Hartzell's oxygen insufflations into the normal dental socket, probably penetrate because of the pressure that is used and also because of the burning effect of the pure oxygen on the tissues. His findings of streptococcus viridans at the apices of normal teeth are results that I can not confirm; as I have found such teeth invariably sterile.

Hartzell's findings of pathogenic organisms in

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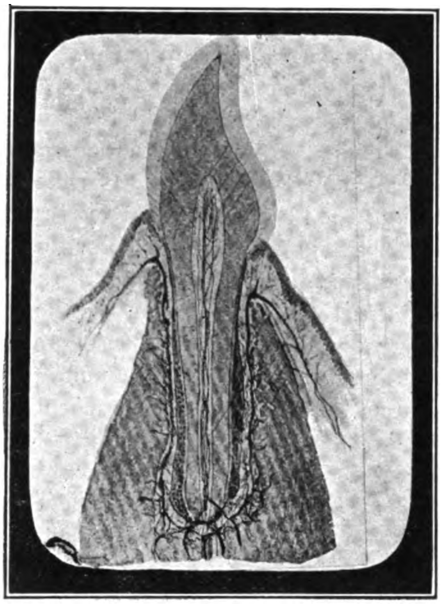
[3] Pacific Dental Gazette, December, 1915.



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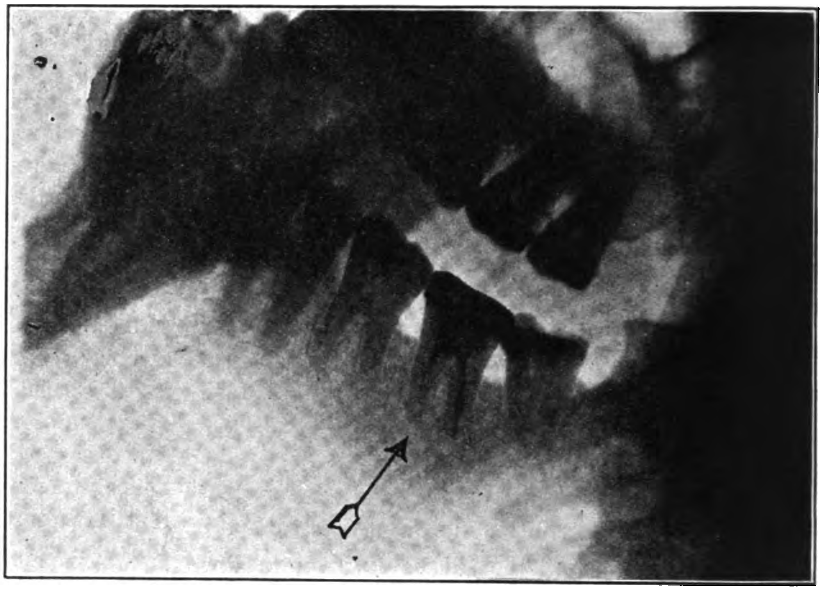

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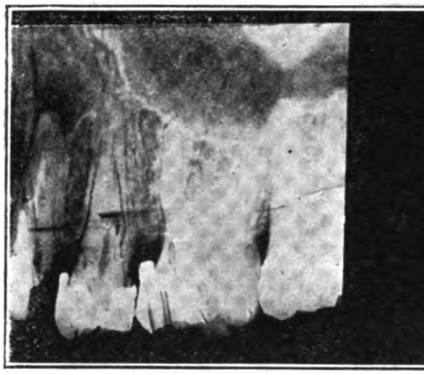

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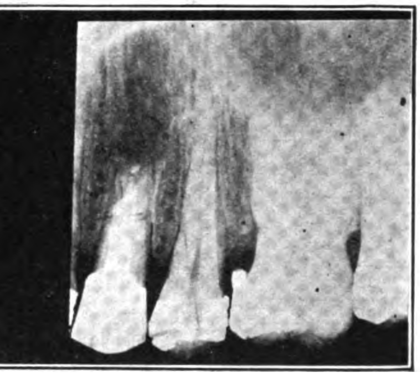

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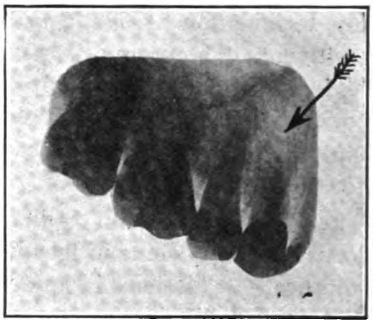

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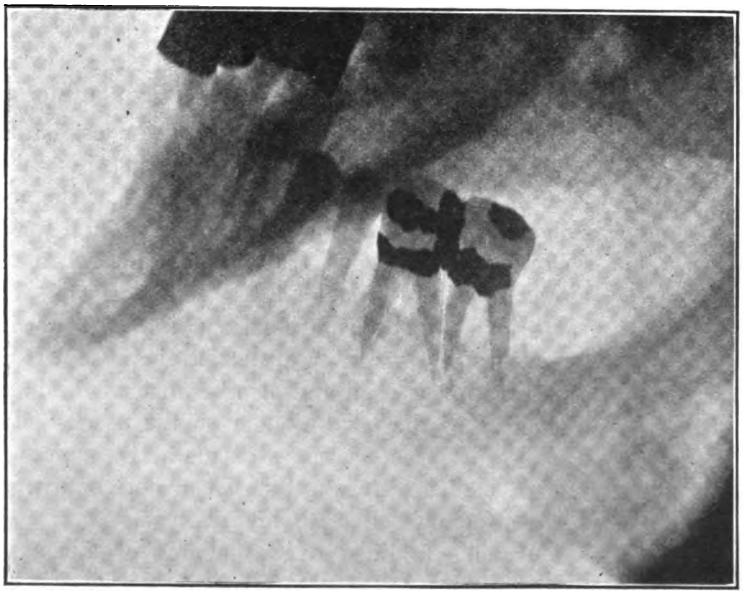

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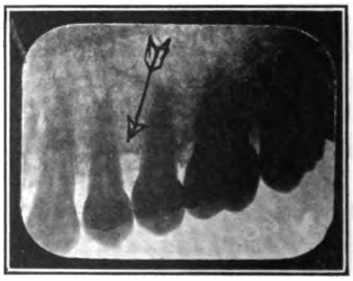

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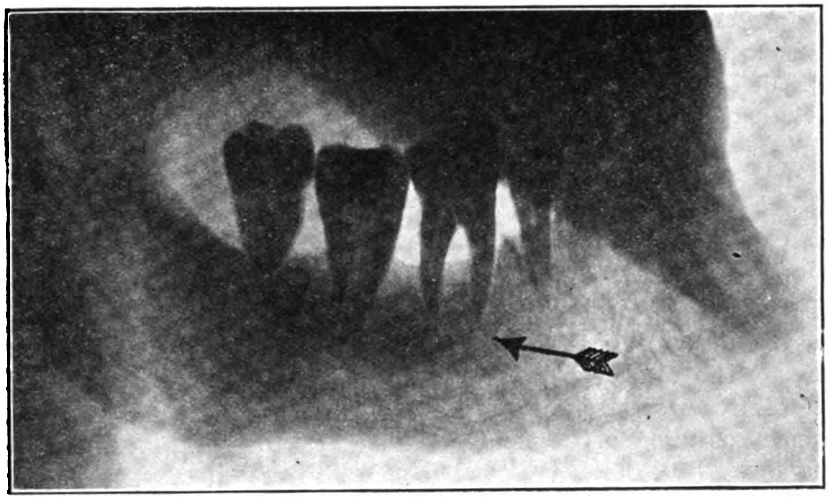

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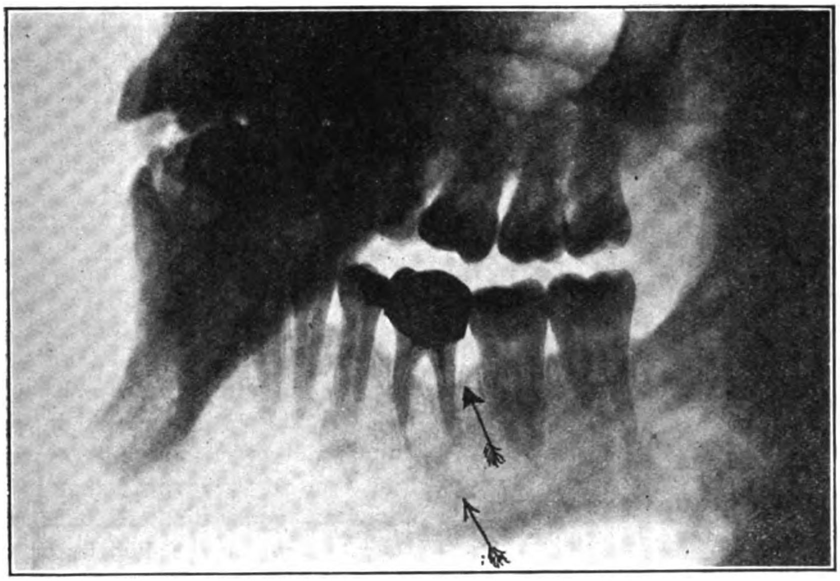

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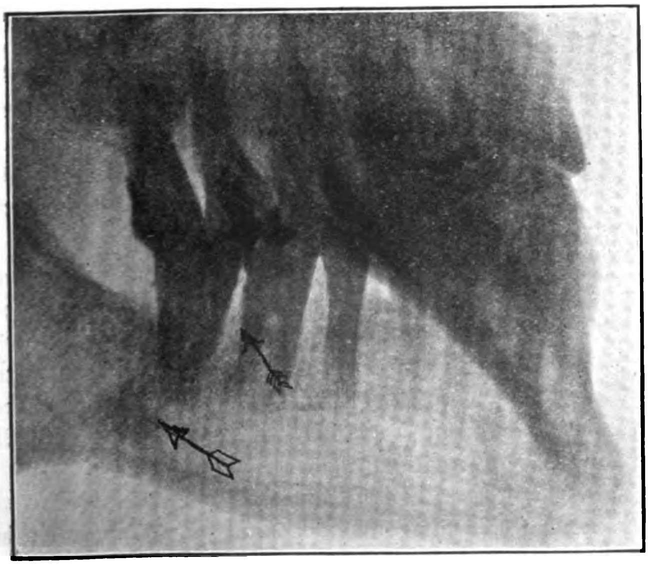

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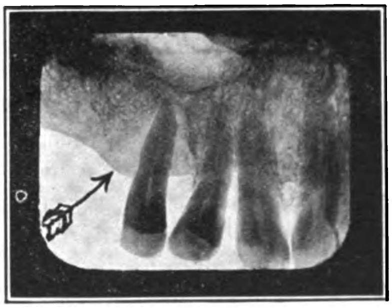

Slide 10.

normal tooth joints are undoubtedly due to faulty technic. Also his statement that suppurating tonsils could not be responsible for an embolic "pyorrhea," because of the fact that hemolytic organisms are seldom found in these dental infections would probably be accurate, if it were proven that only hemolytic organisms would be carried by the blood stream; and also if all hemolytic strains could readily be identified as such.

Streptococcus hemolyticus has been isolated from some of my cases, though it is very true it is not commonly found. The theory of transmutation when applied to streptococcal strains, would be apt to cause some confusion in the study of these organisms.

Some of us are apt to believe that the last word has been said regarding the different streptococci and also other bacterial organisms. The difficulty, however, that I have in securing uniformity in bacteriological reports, indicates that the faults are not always due to the surgeon's technic. There is a possibility that the different strains of bacteria are not always recognized; also the causes which influence changes in bacterial strains are not always correctly interpreted.

In his discussion of tooth cementum, Hartzell[4] speaks of lacunae as being most numerous near the ends of the dentinal tubuli and diminished in number as the surface is approached. This contradicts the view of men that make dental histology their life work. The general findings have been that human cementum, particularly the first deposition on the tooth root, on that part next to the tooth dentin, is usually free of lacunae. It is merely a structure less calcic exudate from the socket, which serves as an attachment for the ligaments of the dento-alveolar joint. I believe Hartzell's bacteriology will prove as defective as his dental histology.

His ideas regarding the treatment of dead abscessed teeth, will also bear scrutiny. He speaks of finding sterile abscess bags on the ends of extracted teeth, following electrolytic treatment of such teeth, before removal. This would be good news, if these results were due to such attempts at sterilization. There would be no more tonsillectomies; no more operations for necrossed bone. In fact, who knows where we should stop? Turn on the "juice" and annihilate infection.

This ionic medication, as advocated by Hartzell, M. S. Rhein of New York, and others, would be a questionable procedure when confined to soft structure. When used to treat a dead, stinking tooth, it could be considered only as an effort to retain in the human body that which should be thoroughly removed by radical surgery. Hartzell claims to find sterile abscess bags post operative to ionic treatment. I have no difficulty in securing negative bacteriological reports from such specimens, with no treatment whatever.

Laboratory or surgical procedure may be faulty, or again, the bag may be a retention cyst, with sterile contents. The sterility of the contents, however, does not necessarily mean that the bag could be considered harmless to the body of its host.

TREATMENTS MUST BE GOVERNED BY CONDITIONS PRESENT.

Serumal deposits that are industriously removed by the dentist, are generally the result of the inflammatory reaction and not the direct cause of it. They are composed mainly of blood fibrin and an earthy salt, undoubtedly calcium; and may be considered as the result of exudation of blood fluids and corpuscles through the blood vessel walls.

It will readily be understood then, that cleaning and scaling teeth may remove deposits that are apt to keep up the inflammatory trouble; but the most ignorant enthusiast would hardly feel that he had removed the cause of these serumal deposits. Excess occlusion, or septic or other embolism will cause a thrombosed blood supply of the dental socket, followed by exudation of blood fluids and formation of serumal deposits. This is the type of "pyorrhea" that has been laid at the door of "gouty diathesis." Here again, cause and effect seem to be hopelessly confused. Septotoxemia would probably be the modern version of "gouty diathesis." The term diathesis, in this instance, indicates a convenient inaccuracy in diagnosis.

If the exudate is caused by the pinching of bloodvessels passing through the pericemental fibers, due to excess occlusion during mastication, the adjusting of the bite with temporary immobilization of the tooth in its socket, will be of more importance than the tooth scaling.

Salivary deposits, loss of mesio-distal tooth contact, irritation from imperfect dental work, mal-occlusion, loss of opposing teeth for occlusion, thickened alveolar process with impoverished blood supply, dead teeth, tonsil and upper air passage infections, systemic cachexia, these all influence the method of treatment.

It will readily be seen, that from this point of view, the use of hypodermatic or intravenous injections of drugs and vaccines for the cure of

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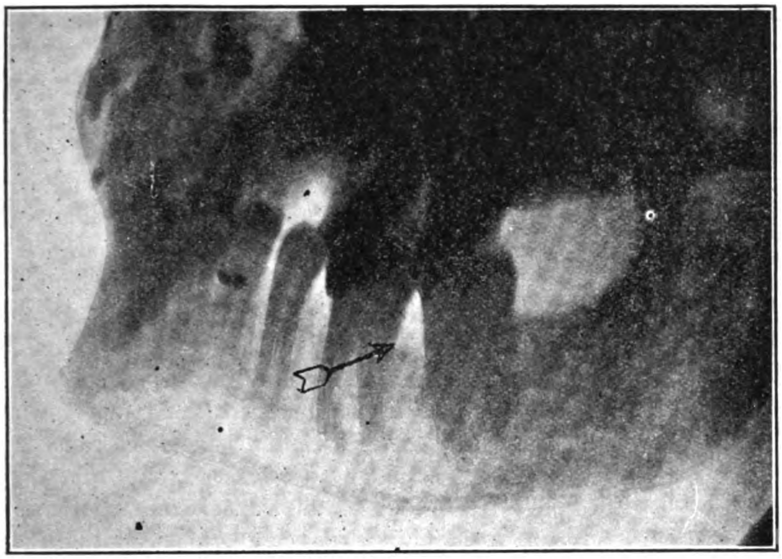
[4] Pacific Dental Gazette, December 1915, page 183.



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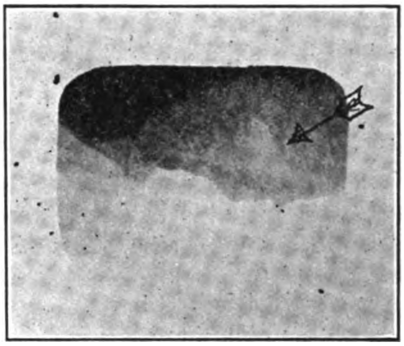

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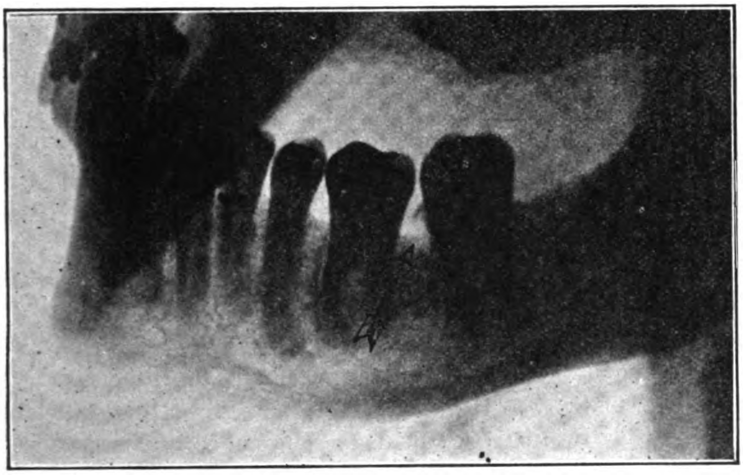
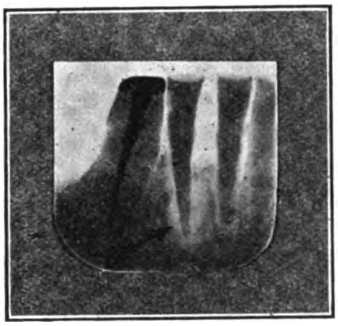
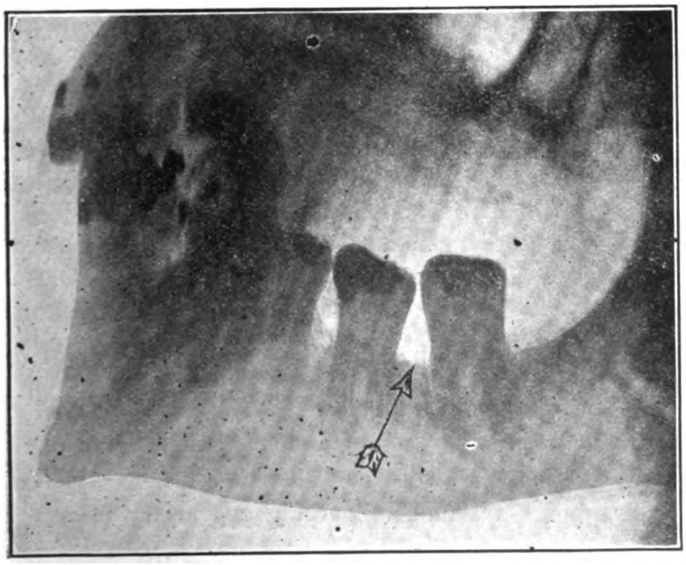


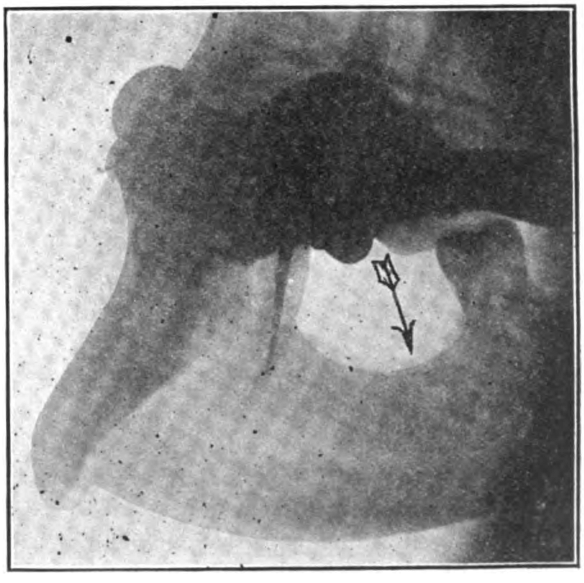
Slide 12. Eighteen months after Slide 11.



Slide 14. Part B.



Slide 13. Eighteen months after Slide 12.



Slide 14. Part A.

tooth exfoliation, the results of disuse, for sclerosed alveolar process and lessened blood supply, the result of septic inflammation for trauma from purely mechanical insult, or for mechanical problems of occlusion, should justly be relegated to the scrap heap.

The cure of "pyorrhea" depends on two factors: —First, the early removal of the cause of the inflamed condition; second, the amount of tissue lost. This would include the extent of tissue change in the dento-alveolar joint and the amount of osteoporosis in the alveolar process. Tooth roots that have become infiltrated with mouth fluids or root sockets that have been destroyed along with the pericemental cells and fibers, can not be restored to normal. Expectant treatment applied to these conditions would be anything but conservative. Conservative treatment would take the form of radical removal of the infected parts.

Diagnostic Helps.

A diagnosis of "pyorrhea" will be determined only after a thorough examination leading to the cause of pericemental infection and detachment.

If the cause of suppuration is purely local in the form of imperfect dental prosthesis, or abnormal occlusal stress; mouth examination and the study of plaster models of teeth, showing the direction and force of occlusion will be necessary. A radiographic study of the entire jaws and teeth, whether partly edentulous or not, will give material assistance in diagnosis. Blood pressure is taken and urinalysis is made as a matter of routine. A general medical history is at times illuminating.

The fact that any of the chronic and also acute pathological changes in the dento-alveolar joint, independent of gingival involvement, are due directly to septic embolism or to a contaminated and impoverished blood supply, the result of infectious focci close by, seems to have escaped notice. If the pathology is due to the presence of a dead tooth, carious alveolar process, or infection in accessory air passages, or tonsils, these, must be corrected; otherwise, little permanent improvement need be expected. Suppurations that are of metastatic origin, when in the hands of the general dentist for diagnosis of direct cause, will frequently necessitate the services of a consultant.

Types of Cases and Treatments.

Cases due to simple local causes, taken in time and treated before the tissue cells and dento-alveolar joints have lost their identity, will return to normal health after the cause of injury is removed and the teeth are temporarily immobolized. Stimulation in the form of long, hot, normal salt irrigations will shorten the time of resolution. Reattachment of pericemental fibers and cemental formation with complete recovery may be expected.

The so-called systemic "pyorrhea" will be observed in cancerous cachexia and other wasting diseases, that not only lower the general tone and resistance, but also inhibit local healing and offer opportunity for inflammation and suppuration to run a riotous course. General mercury and lead poisoning, when associated with dental suppurations should be considered as local irritants, because of their elimination by the salivary glands.

A blocked and contaminated blood supply would probably be classed as a systemic cause for "pyorrhea;" though the cases that have been thought to be due to this cause, were restricted to tonsil, mastoid, air passage and dead tooth and necrosed jaw suppurations.

The treatment of these dental troubles will bring about no permanent improvement until the exciting cause is removed. The chronic cases are insidious in their development, and are usually accidentally discovered with the *x*-ray. Examinations will show an apparent atrophy of the alveolar process, which is frequently diagnosed as a physiological atrophy. Senile and possibly interstitial atrophy are the only physiological atrophies of the alveolar process Other forms should be considered pathological.

Lantern Slides.

Slide 1—This was taken from the work of Noyes. I have reason to believe that the blood vessels that dip down into the dental socket from the gingival margin, are probably as important as is the supply coming up from the apical region. Other vessels will be seen penetrating through the lateral walls of the alveolus into the dento-alveolar joint.

This threefold blood supply was demontsrated as early as 1870 by Wedl, a German. Hopewell Smith, the English Histologist, and Noyes, the American, have also demonstrated this supply, not only in human beings, but also in developing tooth buds of other mammals.

Some of the arteries terminate in the apical region, while others terminate midway in the dental joint.

Some years ago Black[9] stated that it was difficult to determine whether the blood vessels entered the dental joint in the apical region, or whether they ended there.

Billings' teachings regarding end artery infarct, will appear pregnant with meaning in the study of septic involvements of tooth sockets.

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[9] Black's Special Dental Pathology, 1915 (page 117).

It will readily be seen that circulatory disturbances of the tooth socket could be brought about in several ways:—First, by end artery complications in the form of sclerosed vessel walls, or direct embolic troubles; secondly, by thrombosed gingival supply from irritation or trauma directly on the gingival margin, due to defective dental prosthesis or many other purely mechanical injuries; thirdly, by the pinching of lateral blood vessels between the socket ligaments, the results of excess or malocclusion. This circulation with the exception of the apical supply is not necessarily immediately interfered with following death of the pulp.

The question has been asked: if a devitalized tooth is dead and putrescent, why is it not exfoliated?

It will be seen from this slide that the root of a tooth is covered with a deposition of cementum, or cement substance, that attaches the fibers of the pericemental ligaments to the tooth root and retains the tooth in its socket. This cementum is laid down by the specialized cells of the alveolar socket, the cemento-blasts, irrespective of whether the tooth is vital or not.

The few dead teeth that seem to be harmless as far as local or systemic injuries are concerned, are probably securely encapsuled with calcic exudate over the entire root length and apical foramen, Lacunae, when present in cementum are irregular, much distorted, and usually imprisoned in the lamellae, instead of lying between them.[10] The weight of evidence supports the theory that cementum is normally structureless. The presence of lacunae is due to inflammation.

It will be seen, then, that death of the pulp leaves the tooth with no source of nourishment; and subject to the laws of decomposition which influence the changes in dead organic matter.

The prognosis relating to the future use and retention of dead teeth, probably depends on the covering over of the apical foramen by calcic formation from the socket: also the prevention of rapid putrefactive changes in the tooth dentin.

The question has been asked: why are dead teeth less mobile in their sockets than living teeth? This probably is due to the fact that the pericemental fibers are generally rapidly calcified, following pulp removal. The socket, many times, becoming almost obliterated results in more or less ankylosis. This is confirmed by operation.

Noyes claims that he has never seen a true ankylosis, as remnants of a fibrous layer are generally present between the calcified layers.

Replanted teeth are always ankylosed. These teeth are prepared by sterilization in bichlorid of mercury solution, and after other appropriate measures, are replanted. The blood fluids that fill the tooth joint, result in a complete obliteration of the joint space, by calcic formation. This technic will give as high a percentage of successful replantations, as the technic that has been advised by others, in which efforts are made to preserve the bodily temperature in the tooth to be replanted, with the idea of keeping imaginary cell and vessel structure alive on the root surface; so that "vital" re-attachment will take place with the socket.

Slide 2—This shows a lower second molar, eight months after replantation. The root ends have been amputated, the tooth has been bathed in bichlorid solution, followed by normal salt, and the canal work has been done before the replanting. The tooth is now carrying a half crown and is standing heavy mastication.

Slide 3—Before root amputation of upper 1st bicuspid. The second view shows the same tooth three weeks later, indicating rapid bone formation.

Slide 4—Same case 2 years after operation. The typical joint appearance extends over the amputated root end.

Slide 5—This is one of the advanced stages of tooth exfoliation, the result of twelve years' lack of occluding surface. The tooth roots were still vital, but were septic from the infiltrating mouth fluids. The patient was given the emetin treatment about one year ago to "cure" this condition.

Slide 6—Another case of exfoliation complicated with sclerosed alveolar process, the probable result of septic inflammation. Such teeth should be removed. Attempts to "cure" them would be a waste of time.

Slide 7—In this case, blood vessels supplying the bicuspid teeth were found blocked. This was noticeable on the gums over the bicuspid teeth. There is a probability that other small vessels that are not in plain view, are similarly affected. Notice the absorption of alveolar process between the bicuspids. Here is a clear picture of an early pathological atrophy following embolic inflammation. It is much in advance of any visible suppuration. Urinalysis in this case indicated a trace of sugar and of albumen. Nose and throat were negative as far as active suppuration was concerned. There were a few septic teeth present.

Slide 8—This slide is the same case as slide 7. Notice the alveolar wall destruction around the lower 1st molar and also the areas of thickened cancellous bone. This tooth is thoroughly septic.

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[10] Hopewell Smith's Dental Histology.

Slide 9—This patient reports every now and then, with an acute abscess of the dental joint, the gingival margin being normal. Since the apical region also is not involved, the trouble seems to be a hematogenous infection about midway between these two points. The patient has one dead tooth. He also has a history of nasal and mastoid suppuration. He is attacked with an acute skin affection about every 12 months, which has been diagnosed as "Poison Oak." Note the thickened area of bone immediately below the 2nd molar. This is in the bone and should not be confused with calcic formations in the submaxillary glands.

Slide 10—The same patient as in the preceding slide. This shows the secondary destruction in the alveolar process of the 2nd bicuspid tooth, caused by the forces of occlusion, following an embolic abscess of the dento-alveolar joint.

Slide 11—An atrophy of the mandible. Above is an antrum infection resulting from two septic molars.

Slide 12—Same as preceding case, 18 months later. Note the alveolar resorption between the gingival region of the molars. A small fragment of process is still in evidence on the front surface of the last molar.

Slide 13—Same as preceding case, 18 months later. Notice the extensive loss of alveolar septum. The lack of function is assisting in alveolar destruction. The resulting resorption differs, however, from that induced by excess of occlusion, which causes a greatly enlarged socekt from the lateral stress.

Slide 14—This X-Ray of the mandible shows an area and a small vent which apparently permitted subperiosteal drainage. An abscessed tooth had been "pulled" from this socket 30 years before. At operation offensive granulations were removed. A little thin greenish blue pus was evacuated. The cultures unfortunately were contaminated, as were those from the abscessed lateral seen in the smaller section. This lateral pulp death was undoubtedly due to a septic embolism. The serumal deposits on these roots were removed and sent to Dr. Victors for examination. Dr. Victors reported that they consisted of blood fibrin and an earthy salt, undoubtedly calcium. This was interesting as it agreed with both Dr. Victors' ideas and my own, regarding the formation of these deposits. It showed that they need not necessarily consist of urates.

Black[11] stated that to his knowledge no analysis had ever been made of these deposits.

These are the deposits that have been laid at the door of "gouty diathesis."

(To be continued.)

CHRONIC GALL-BLADDER DISTURBANCES.

A. HENRY DUNN, M. D.,
CHILLICOTHE, OHIO.

Explorations within the abdomen have demonstrated the frequency, of as well as the common failure to diagnose, gall-bladder affections.

The most frequent chronic conditions for consideration are cholecystitis, cholelithiasis and malignancy.

CHRONIC CHOLECYSTITIS. Chronic cholecystitis may be with or without calculi; in the majority of cases it is associated with calculi. Cholecystitis is practically always bacterial. Streptococci, colon and typhoid bacilli are the most common germs.

Rosenow and Dunlap have produced 6% of cholecystitis with streptococci, in the recent streptococcus sore throat epidemic, in Chicago. In connection with the harboring of streptococci in the throat and sometimes in the appendix, this has obvious significance.

Rosenow demonstrated that gall-bladder streptococci have a special predilection for the gall-bladder in 80% of the experiments if injected into the veins of animals.

Typhoid and colon bacilli are not nearly so frequently responsible for the infection as was formerly contended.

Cushing claimed that 30% of gall-stones cases gave a history of typhoid infection, but the Mayos' did not confirm this finding.

As to whether infection reaches by portal circulation, general circulation or through the duodenum, evidence appears to support the view that anyone of these sources may be responsible, but that the portal and general circulations are most frequently the origin. Deaver mentions the lymphatics and juxtaposition as sources of infection.

Like peptic ulcer, though not with such regularity, cholecystitis is capable of a quiescent stage. The mildness of infection is not necessarily a guide in chronic cases as to extra-cystic pathology. Accompanying cholangitis and pancreatitis, are not infrequently found in chronic clinically mild cases, —cases that were treated for years for "gastric catarrh."

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[11] Black's Special Dental Pathology, 1915.

Humanity would have been far better off, had the term chronic gastric catarrh, never been coined.

Like rheumatism, the term gastric catarrh, has served the doctor wonderfully in his explanation to a patient whose gastric condition could only have been helped by more thorough study and observation or exploration.

Dyspepsia is the most common complaint in cholecystitis. I know of no other condition that can be diagnosed by exclusion as much as can gall-bladder dyspepsia. Gall-bladder dyspepsia has no pathognomonic sign except it be, indeed, its irregularity.

To put it as it often occurred to me during operative surprises, if you are put in a position where you have to guess on lesions of the upper abdomen, you will more often guess right on accusing the gall-bladder than all other organs put together.

Peptic ulcer will announce itself, typically, by the history of pain at definite intervals after food ingestion, relief by food or alkalies, hyperacidity, fall and winter recurrences and *x*-ray findings.

Other diseases are frequently recognizable by other regular signs or symptom-complexes. But when there are irregular dyspepsia, irregular x-ray findings, irregular pains and irregular gastric findings; in short; if you have to deal with a dyspepsia so irregular that you must guess, then most likely it is due to a gall-bladder condition to deal with. We assume that ptosis and other conditions have been excluded.

Needless to say, characteristic colicky pain, especially with jaundice or Charcot's fever, with a positive Murphy deep finger palpation sign or stones in the stool, a diagnosis is comparatively easy.

Distress in the right hypochrondriac region, if present, is of great value and may be the only local symptom elicited.

I wish to mention the value of stomach analysis, if correctly estimated. The work of Rehfus and his collaborators has revolutionized the conception of gastric residue and chemistry. The Rehfus tube has been of greatest assistance in the fractional study of gastric activity in my cases of dyspepsia.

In doubtful cases I heartily voice the opinion of the great surgeon, Moynihan, who says that because surgery has done so much in dyspepsia, and the mortality of exploration is practically nil, an exploratory operation is in order far more frequently than we have had it heretofore. "This is the only prophylaxis worth considering in gastric cancer cases, and your dyspepsia may be an early gastric cancer, cleared up by this laparotomy" (Moynihan).

When there is a mass in the right subhepatic region, where you are in doubt as to whether it is gall-bladder or kidney, it is usually the gall-bladder. This, of course, applies to cases that present no symptoms beyond the mass.

Undoubtedly, many cases of gall-bladder disease simulate peptic ulcer and appendicitis. The latter is especially true in children in whom the cecum is higher and the liver lower than in adults and hence the appendix and gall-bladder are closer neighbors. I do not feel much provoked if, in a child, a presumed appendicitis proves to be a gall-bladder disease.

Recently I operated upon a woman who had her breasts and adnexa removed for cancer. She showed lactic acid, achlorhydria, occult blood and continuous vomiting of bile and a 12-hour residue. Most of these signs spoke for gastric cancer except the vomitus of bile, but she had a strawberry gall-bladder.

The more I explore the abdomen the more I am convinced that, though many symptoms are caused by definite lesions and many more symptoms are neurotic, yet there are nearly as many lesions in the abdomen that show no symptoms. A gall-bladder lesion is one of the most frequent of this kind.

As a parallel I cannot resist quoting Wilkie of the Royal Infirmary, of Edinburg, who found nearly 10% of duodenal ulcer in 490 autopsies at the Infirmary, only six of which had been diagnosed antemortem.

To my mind the well known statistic compiled in Germany, where 12% of autopsies reveal gall-stones, do not begin to cover the percentage that could be found as having gall-bladder infection without stones.

More than 10% of the operative cases at the Mayos', have gall-bladder affections, accompanying other conditions. On the other hand, many operations for gall-bladder disease, often reveal other diseases, some inoperable. How many cannot confess to operations for gall-bladder disease that have demonstrated inoperable cancer of the liver?

Jaundice is the one great symptom that is mostly responsible for these many unnecessary operations. I think jaundice is too often waited for by some men before clinching the diagnosis. Jaundice in a gall-bladder disease, like hematemesis in gastric ulcer, has been for many years the pathognomonic symptom among us. It is mostly to the surgeon's credit that he classified jaundice as a symptom of extra-cystic rather than intra-cystic trouble.

Surgically, jaundice stands for obstruction. The obstruction is either inflammatory within or without the common duct and may have nothing to do with the gall-bladder, or it may be obstruction inside the common duct by stones or ascaris lumbricoides, or obstruction outside by tumors or enlarged lympth glands. Seventy percent. of common duct stones cause jaundice some time in the course of the disease.

A. O. G. Kelly claims that 35% of cholecystitis without stones produce jaundice. My cases do not show so high a percentage.

Steady persistent jaundice is rarely biliary jaundice, but is malignancy of the liver; when due to malignancy it is usually painless and of slow onset. A duct jaundice is usually not so deep or so persistent.

The gall-bladder is atrophied in 86% of cases of common duct jaundice (Courvoi sier), therefore a mass of jaundice usually mean malignancy.

Emaciation rarely precedes biliary tract jaundice if there be food toleration. Food toleration usually is the case with liver malignancy, in my experience. In other words, if there is emaciation in biliary disease, it is mostly due to food intolerance for a protracted period, whereas in malignancy the cachexia is not a direct starvation cachexia; loss of weight is only part of the cachexia.

The surgeon encounters cases of malignancy due to gall-stone irritation; such was the case in 4% of the cases operated on by the Mayos.

About 90% of primary carcinoma of the gall-bladder have stones, and only 15% of secondary carcinoma. This proves the importance stones play in malignancy (Kehr). Moynihan's records show that 95% of his cancer cases in and around the gall-bladder are due to stone irritation. In these cases the previous history of stone will not help to decide that the case is not beyond operability, nor will it help the diagnosis. Besides there usually is a period of quiescence, to mislead one in the history. Hence, operations too late in these cases will always be performed to some extent.

Most liver malignancies are secondary to that of cancer in other organs, especially the gastro-intestinal tract. One-third of the cancers in the body are situated in the stomach.

Most primary liver carcinoma is with cirrhosis, which is one of the main reasons primary carcinoma is often taken to be cirrhosis until very late in the cancerous involvement.

Gallstones: Three women to one man are victims of this malady. At least 5% of the population is estimated to have gall-stones. Twenty-five percent. of all women have gall-stones (Naunyn).

Many experimental mild cholecystitides result in gall-stone formation.

Infection is so frequently a cause of stone formation, that it was believed to be invariably the cause of stones, but Aschoff's late experiments, which are very reliable, lead him to the conclusion that stones may form without infection. Aschoff states that the cholesterin from the dead epithelium in the gall-bladder can form stones without infection. Cholesterin, as we know, forms about 75% of the stone and the rest is lime salts. This is important to remember when taking *x*-ray pictures for stone detection. Clumps of bacteria are often found in the nucleus of stones, but not invariably.

Rovsing has proved that the gall-bladder is sterile in 50% of gall-stone cases, and he contends that if infection be present with gall-stones it is secondary. He cites urinary stones as an example that calculi do not tend to become sterile in time, but rather to become infected, so that his conclusion is that most of the infected stones become so in time but were sterile to begin with.

The location of formation is of great interest to surgeons. The gall-bladder, undoubtedly is the chief seat of formation. Occasionally a stone is formed in the intraphepatic duct. This is important, since the question after cholecystectomy arises sometimes as to whether recurrence of the colic has been caused by a stone overlooked at primary operation or by a stone formed after cholecystectomy.

The opinion of good men appears to be that the formation in the hepatic duct is so rare that the greatest prophylactic against formation of stones after cholecystectomy is removal of all stones at the time of the primary operation. This is true as to stone but it cannot be said of all biliary troubles, for trouble of the biliary tract is frequently encountered after cholecystectomy.

Symptomatology. Many cases are overlooked because of the mildness of the symptoms or absence of symptoms. Many more are treated for other diseases, but most often for chronic gastric catarrh. Dyspepsia is the most frequent mode of manisfestation of gall-bladder trouble of any kind, though the dyspepsia case is the exceptional case that reaches the surgeon for primary biliary tract operations.

Cases come to the surgeon usually for jaundice, for fever and for colic and distress,—very rarely for dyspepsia unless it is because peptic ulcer is suspected.

The aid of the *x*-ray specialist has been of great assistance in the diagnosis of gall-bladder conditions in some cases. About 50% of gall-stones are demonstrated by some *x*-ray men, notably Cole and Carman. The average *x*-ray man does not get so high a percentage of positive radiographs for stones.

The value of the x-ray is further enhanced in the exclusion of gastric and duodenal ulcer, yet many pylorospasms that are reflex to gall-bladder or appendiceal trouble will give a residue and findings misleading the surgeon. The absence of residue, hyperperistalsis, duodenal deformity and other *x*-ray findings, greatly facilitates the diagnosis between gastro-duodenal and biliary trouble.

The primary biliary tract case that comes to the surgeon does not come for gall-stones *per se.* They come for symptoms that result from complications such as stones in the common duct, stones impacted in the cystic duct, cholangitis of the cystic, common duct or the deep ducts of the liver with or without pancreatitis. Often it is difficult to recognize these complications even on exploration, and this is important when we come to discuss cholecystostomy *versus* cholecystectomy.

TREATMENT: The sooner the physician comes to the conclusion that the dyspepsia is a surgical dyspepsia and the sooner the physician calls in the surgeon, the less discredit will he incur to himself and his colleagues. The most frequent cause of failures in operation is waiting until the ducts are full of stones or inflamed. Many patients will not listen to the advice, but eventually will be grateful even though they get away and make the rounds of the various cults for amelioration. An important point I wish to make is that many cases of cholecystitis, if without stones, are overlooked at operation.

After the patient comes to the surgeon and a diagnosis is made the procedure in the particular case will differ with the particular surgeon.

The question "cholecystectomy or cholecystostomy", has occupied the arenas of surgical gatherings for a few years. After the smoke of the battle has cleared away, the impartial average surgeon will find many more cholecystectomies indicated than have been performed, yet that cholecystostomy will be more popular than cholecystectomy. This statement is particularly true as to those surgeons who have a mixed, i. e., both acute and chronic service.

Cholecystostomy will be more popular just as long as the principle of drainage in inflammation is the ideal surgical principle.

There is no doubt that cholecystectomy is an ideal operation in some conditions, notably chronic empyema, primary carcinoma, shrunken fibrous gall-bladder, hydrops, gross injury to the cystic ducts and gall-bladder by stones or injuries incurred in the removal of stones. But many surgeons of international repute remove gall-bladders, where equally as noted men perform cholecystostomy.

Both sides back their procedures by such strong arguments, that it is evident that each one of us must decide just which procedure should be adopted for himself.

Let us remember that cholecystectomy is a serious operation and that cholecystostomy is so slight an operation that one surgeon (McArthur) has used it as a therapeutic fistula in his gastric surgery.

Personally I think that the pendulum does swing toward cholecystectomy, but will surely reverse after the popularity of cholecystectomies has worn off. My reasons are:

First: Stones seldom reform after cholecystostomy. The Mayos claim only a single case in which stones reformed out of 1200 cholecystostomies.

2nd: There are many recurrences after cholecystectomy.

3rd: Some remove the gall-bladder on the assumption that it is the only seat of stone formation and that the stone formation is due to an inflammation of the gall-bladder. Gall-stones are not invariably formed in the gall-bladder nor are they invariably the result of an infected gall-bladder, since over 50% of cases with gallstones, have sterile gall-bladders (Rovsing).

4th: It is unsurgical It is overstepping surgical bounds to remove organs that have a function since, unlike the appendix, the gall-bladder is not a rudimentary organ. This is demonstrated by the fact that nature tries often to reform a gall-bladder from the stump of the duct left in cholecystectomy, and the fact that bile is half as irritating to the pancreas, if it come from the gall-bladder as bile coming from the liver.

5th: The facilities of the average surgeon, unlike the facilities of the various group clinics, do not facilitate observation and study of all cases to the same extent, nor are we all as skilled pathologists. Therefore we are apt to remove the wrong organ to ameliorate certain borderline conditions which is more serious than if we had just drained the gall-bladder.

6th: The best pathologists will in a certain number of cases overlook cholangitis, stones and pancreatitis.

7th: Many of the best men claim a higher mortality for cholecystectomy than for cholecystostomy. Out of 45 surgeons of note, 21 claim a higher mortality for cholecystectomy (Guthrie). Bevan claims twice the mortality for the former.

8th: The mortality in cholecystostomy can often be obviated by additional procedures, whereas in cholecystectomy the patient sometimes dies with severe vomiting and retching after the operation before one has a chance to interfere. Critical states of the patient, post-operative hemorrhage and insufficient drainage from a cholangitis or pancreatitis often obvious and serious conditions, that will be overlooked by the best men and more frequently by the average man, will be responsible for rapid demise after cholecystectomy. One may ask, how about choledochotomy, if necessary, after cholecystectomy. This is not a practical question, because when your patient is exhausted from a cholecystectomy and vomiting, choledochotomy means almost sure death. Choledochotomy is a difficult operation, leading to scar formation and yet if not performed in remaining post-operative cholangitis, pancreatitis or local hepatitis, it would mean that we expect drainage through the tiny papilla of Vater, two and one-half m. m. in diameter. Opie points out that the drainage may have to depend upon the accessory duct of Santorini. This argument appears to be only theoretical in cases of severe inflammation.

10th: The argument that a second operation may have to be performed, after cholecystostomy, does not hold water when we recall the Mayo statistics quoted, and when we remember that cholecystectomy is a more dangerous operation and that two safe operations are far better than one dangerous one. If in doubt, the patient himself would always decide for two operations, had he the choice. As Beaver puts it: A living patient with a gall-bladder, is better than a dead patient with no gall-bladder.

SUMMARY. 1: There are more gall-stone affections than we suspect, as demonstrated by systematic examination of the gall-bladder during operations.

2: Streptococci are probably the most frequent primary causes of gall-bladder infection, since we harbor the germ in such common diseases as tonsilitis and other sore-throats.

3: Irregular dyspepsia is the most common mode of manifestation of gall-bladder disturbance.

4: In doubtful cases of prolonged dyspepsia one is justified in exploring the gall-bladder after ptosis and other conditions have been excluded.

5: Some operations could be avoided in inoperable cancer of the liver, if we would remember that jaundice, if severe and persistent is usually not gall-bladder jaundice and that loss of weight is either due to food intolerance or the cachexia of cancer.

6: There is a great percentage of primary cancer of the biliary tract to be avoided by removing stones, more frequently than is done now.

7: Gall-bladder trouble is a surgical malady.

8: Not all gall-bladders that have stones are infected; 50% are not.

9: Undoubtedly many recurrences can be avoided by removing all stones in the ducts at primary operation; the gall-bladder is not the only seat of their formation.

10: The issue of cholecystectomy *versus* cholecystostomy will most likely result in a better standardization of the two operations, but cholecystostomy will remain the safer and more frequent operation.

63 W. Second Street.

ADHESIONS IN THE REGION OF THE DUODENUM.

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The adhesive bands between the stomach or duodenum and the liver or gall bladder, are, in our experience, of two kinds:

1. Those of a distinct inflammatory nature with a very evident etiology.
2. A class which exists without any other pathological condition in the vicinity. Membranes and bands of various degrees of strength and extent, which are non-inflammatory in appearance, and resemble altered peritoneum. It is this latter type which we shall discuss.

Soon after the publication of Lane's ideas with regard to intestinal stasis, Seton S. Pringle, Mr. Gray and several others described these bands in considering the whole intestinal tract. M. L. Harris has regarded this condition as an entity, and it is because we think the subject is deserving of such consideration, that this discussion is undertaken.

ETIOLOGY.

Much evidence has been given of the congenital origin of these bands. We believe, however, that they are in the majority, non-inflammatory fibroses as described by Adami. It was not until we studied his ideas on the subject, that we felt that we had a true explanation of this peculiar condition. He has clearly described how bacteria pass through the intestinal wall, where they are generally killed before multiplication and active inflammation. The death of the micröorganisms produces toxins which cause alteration or death of the tissue cells, with which it comes in contact. This process, with its subsequent substitution of fibrous tissue for that destroyed, when occurring between opposing surfaces, as the duodenum, the gall bladder, may cause them to adhere. Later any "stress" or pulling on the bowel, will cause lengthening and strengthening of the adhesive band. Admitting the possible existence of congenital bands, we believe them to be the seat of further fibrous change. We have seen them in what seems to be the various stages of development, from thin spider web structures to firm strong membranes. Sometimes portions of the same band, show a further stage of development. In operating in other areas of the abdomen, very weak and easily separable bands were discovered by manual exploration, which had not yet caused constriction, and had given rise to no symptoms.

Before taking up the symptoms, we present a few illustrative case records.

CASE I. Mary L. S., age 21, single, nurse. Family History: Negative.

Subjective Symptoms: Patient never had any serious illness. Two years ago had an attack of pain in the epigastrium, and inner right costal margin. Since then the present condition has existed. Paroxysmal distress in the region of the gall bladder, reflected to left nipple, and sometimes around to right costal margin. This causes nausea and sometimes vomiting. Intervals of attack bear no relation to meals. Does not desire food during an attack and never partakes of pastry or "heavy food." Constipation.

Examination: Liver and stomach normal in size and location. Extreme tenderness over pylorus and gall bladder. Blood and kidneys normal.

Gastric Examination: Hyperchlorhydria.

Pathological Anatomy seen at Operation, February, 1913: Very dense fibrous adhesions, between liver and pylorus, involving a perfectly healthy gall bladder. Slight gastroptosis. Uterus and adnexa normal. Appendix normal.

Operation: Complete separation of fibrous bands with knife, freeing liver, gall bladder, and pylorus.

Post Operative, November, 1916: Patient well and entirely cured of her past symptoms.

CASE II. Sarah B., age 50, widow. Family History: Not significant. Healthy childhood.

Subjective Symptoms: Always well with the exception of having attacks of stomach trouble for past fifteen years. At present has distress in epigastrium, more severe after eating. This occurs periodically, especially after eating large meals. When stomach is empty, it is more of a dull ache. During attacks she vomits. No blood. Aching sensation is reflected to scapula. Constipated.

Examination: Liver normal, slight tenderness over gall bladder. Tenderness in epigastrium.

Gastric Analysis: Negative, excepting hyperchlorhydria.

Pathological Anatomy seen at Operation, March 10, 1914: Stomach large with ptosis. Gall bladder normal. Adhesions between liver, gall bladder and pylorus thick and very firm. Abdomen and pelvis normal.

Operation: Separation of adhesions by knife, between and around stomach, liver and gall bladder

Post Operative, September, 1916: Patient well with no return of former symptoms.

CASE III. Joseph S., age 26, single; railroader. Family History: Negative.

Past and Subjective: Patient never sick. For past two years has complained of distress and soreness in stomach. Cannot eat solid food on account of producing above symptoms. Between meals aching occurs, or rather pressure sensitiveness. Pain and vomiting after heavy meal. Constipated. Treated constantly for past two years, with no relief. Loss in weight.

Examination: Liver normal, location and size, stomach dilated. Extreme soreness over stomach and causing pain by producing traction. Sensitive in region of the gall bladder.

Gastric Examination: Hyperchlorhydria. Blood and kidneys normal.

Pathological Anatomy seen at Operation, November, 1915: Very thick, dense adhesions connecting under surface of liver to pylorus and extending to duodenum. Appendix normal. Abdomen normal.

Operation: Complete separation of union releasing liver, pylorus, and duodenum by means of knife.

Post Operative, November, 1916: Patient is in perfect health, gained 26 pounds in weight, and is completely relieved of all former symptoms.

CASE IV. Arthur W., age 31; special representative. Family History: Negative.

Subjective Symptoms: For past ten years has had symptoms referable to stomach and liver. Frequently would complain of "bilious" attacks, a constant sensation of uneasiness in the region of the gall bladder and duodenum, pressure here causing soreness, which was aggravated by eating heartily. Two months previous to operation, complained of soreness in the region of the liver, slightly jaundiced, and unable to partake of food, because of the resultant distress. "Heart burn" was a common symptom. Loss in weight. Constipated.

Examination: Liver enlarged, stomach somewhat enlarged; extreme soreness over liver and duodenal regions; pain experienced upon traction of the stomach.

Gastric Examination: Hyperchlorhydria.

Blood and kidneys normal.

Pathological Anatomy seen at Operation, March 2, 1915: The liver enlarged, the under surface firmly adherent to the duodenum by a thick, dense band. Chronic congestion of liver. No evidence of previous inflammation.

Operation: Complete division of union, releasing liver and duodenum, by means of knife.

Post Operative, November, 1916: Patient is in perfect health, having gained 32 pounds in weight, and is completely relieved of all former symptoms.

From these cases it will be seen, as reported by others, that their extent varies from that of a short band between the gall bladder and nearest portion of the duodenum, to a broad band involving the pylorus, duodenum, gall tract, and transverse colon. Certain signs and symptoms were present in all of our cases. Some were dependent upon the exact area involved.

Common symptoms: 1. Chronic constipation. This is always among the first things noted by the patient, and often the only symptom present for several years. Later there comes occasional desire to defecate at times, immediately following what should have been a satisfactory evacuation. This is very distressing, and we believe it is due to the reflex stimulation, by the distended duodenum and stomach, of the illeo-cecal valve which causes its premature opening, as demonstrated by Hertz.

3. Sensation of fullness and weight in the upper abdomen which, in cases of long standing, finally amounts to a dull ache, occurring at no definite time between meals. It is more pronounced after a full meal of solid foods.

4. Gas eructations. Longer-standing cases have eructation of sour fluid.

5. Nausea without vomiting.

6. Underweight.

7. Neurotic temperament, with frequent headache and dizziness.

8. Hyperchlorhydria. Usually very pronounced.

9. Appetite remains good.

We think this very characteristic in combination with the other symptoms.

Special symptoms: When the gall tract is constricted, or the region of the duodenum into which the end of the common duct empties is involved, there are:

1. Occasional slight jaundice.

2. Pain resembling gall-stone collic but never very prolonged or severe, and easily relieved.

These cases were usually young active persons of either sex, and almost without exception, they had a muscular abdominal wall, although most of them had habitus enteropticus. Many, though not all, have a "dull pulling pain" as they often say, when deep pressure is made in the midline of the abdomen, just above the umbilicus. The Roentgengrapher, can of course, demonstrate the distended duodenum and stomach when it exists.

The differential diagnosis of this condition is being made the subject of further study. However, we can say that these cases are never acute in any sense. The symptoms are at first easily relieved by appropriate medical and dietetic care, but they recur promptly on ceasing treatment. The course of discomfort is always progresively worse. These cases are almost always referred with a diagnosis of ulcer, or gall stones, and most of the first cases observed by us were operated upon with a tentative diagnosis of either one or the other of these conditions.

Prognosis: However divergent the opinions of writers concerning the etiology of this condition, they all seem to agree that when the bands are causing constriction, they may finally give rise to the formation of gall stones, duodenal and gastric ulcer, and abscess. We have seen several cases of this kind where the bands were present, and did not seem to be inflammatory at all. In a purely mechanical way, the blood and nerve supply of the stomach, duodenum and gall bladder is altered, giving rise to a wall of lowered resistance and altered structure in certain areas. The constriction of the lumen of the bowel, and the altered motility cause weakening of musculature, retention of irritating gastric contents and hyperacidity. This constant approximation of irritant and lowered resistance is easily productive of the sequelæ mentioned above.

Treatment: It is evident that the medical treatment is only palliative, and if prolonged, it only subjects the patient to dangerous end—results. The operation of this condition is technically one of the simplest, and the risk is slight. If the bands are cut and not torn, there is no recurrence in our experience, and the results from the patient's standpoint, are the most satisfactory.

In conclusion, we would add that if some part of this discussion seems to be a repetition of previously stated facts, we deem such repetition to be justified by the seeming lack of appreciation of these facts by many physicians even now. Most of the cases we have seen have had their faith sorely tried by years of experience with pills, powders, and potions of all kinds, until they welcome an operation for the sake of variety, if for no other reason.

When this group of symptoms presents itself to the physician he will gain much honor in his own country by calling in his friend the surgeon.

800 Keenan Building.

BIBLIOGRAPHY.

1. Pringle—British Medical Journal, January 24, 1914. Page 188.
2. Gray—British Medical Journal, January 24, 1914. Page 188.
3. Harris—Journal of the A. M. A., Vol. LXII, No. 16, April 18, 1914. Page 1211.
4. Adami—British Medical Journal, January 24, 1914. Page 177.
5. Hertz—Journal of Physiology, No. XLVII, 1913. Page 54.

The Army and Navy need more doctors—lots of them! Have you offered your services?

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THE NON-ENUCLEATION SURGICAL TREATMENT OF CERTAIN FORMS OF PROSTATITIS.

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Now and then we encounter an old prostatic condition which causes the patient much annoyance. We do not necessarily find such a pathological prostate in the aged. The prostates that we find in these advanced males are generally easily enucleated by the two-stage method. This class of prostates is not hard to deal with, for as a rule they have the typical hypertrophied outer coat previously known as the capsule but more recently found to be merely an altered part of the gland itself. It is not with this class of gland that I shall deal.

There is, however, a type of prostate possibly not as frequently seen as the cirrhotic type, which is recognized by three pronounced signs: there is the hang-over morning leakage from the urethra, some interference with micturition, a disagreeable irritated feeling about the neck of the bladder and referred to the glans penis.

Thus it will be seen that we have two distinct types of pathological prostates. On the one hand is the cirrhotic type, with which I shall not deal, and on the other, the soft, spongy, infected and infective type of diseased prostate, which is the one we are to consider here.

For several years I dealt with this latter type of prostate in a rather cumbersome manner. No operative treatment had been brought forward, and we were not able to do anything except to give urinary antiseptics, some massage by rectum, and instruct the patient as to hygiene, sexual habits, diet, care of the skin, etc.

So far as my own observations were concerned I was not satisfied with the results obtained. Repeated urinary tests showed considerable pus, some blood, mucus, and detritus including desquammation. I endeavored to clear up this urinary condition by regular massage of the gland. For a time it would seem to improve, but any let-up in the massage produced a remission, although in the majority of cases the urethra was clear.

As bladder irrigations did not seem to do any good, and pus and blood persisted in the urine, I thought that if in some way that relatively young prostate could be drained, a cure could be effected just as in other parts of the body. The next problem was just how to produce this drainage. The macroscopical pathology of the prostate was carefully studied. In every case the gland was found to be soft and pliable. Now and then a case would be seen where characteristic, small, hard nodules were felt. This type seemed to be a border-line condition, just within permanent establishment of the cirrhosis stage. To prevent this gland from entering the cirrhotic stage would mean much to the patient. With this end in view, I made a careful microscopic study of the normal, as well as the pathological prostate, making liberal use of all the text dealing with this subject. This was the underpinning for the surgical procedure to help these patients.

Histology.

The prostate is a compound, branched, tubulo-alveolar gland. The external layer is made up of dense layers of non-striated muscle fibres, connective tissue and yellow elastic fibres. Processes and lamellæ composed of all these elements extend into the interior of the gland, converging towards the base of the colliculus seminalis. Between the larger of these trabeculæ are located numerous glands which consist of good-sized, irregular alveoli, separated by a fibromuscular septum and trabeculæ. The alveoli of these glandular constructions are lined by simple columnar epithelium and Walker has shown that a delicate basement membrane is present in the form of very fine connective tissue threads. All of these excretory ducts, lined by this simple columnar epithelium, sooner or later become confluent, thus forming numerous collecting ducts, which empty into either the colliculus seminalis or the sulcus prostaticus. Near their termination we find transitional epithelium similar to that lining the first portion of the urethra.

This brief review of the histological appearance of the prostate gland will suffice for the foundation upon which we can build the changes that might and do occur in a diseased prostate.

Pathology.

In dealing with a pathological prostate gland the important things are the outer covering and the alveoli.

In former years the outer covering of the prostate was supposed to consist of a well-defined capsule. Zukerkandl by his ingenuity has proved that no real capsule covers the prostate. What was formerly termed the capsule is simply the hypertrophic condition of the dense layers of non-striated muscle fibers, connective tissue and yellow elastic fibers forming the periphery of the normal gland. If the brief histological review is studied, it will be plainly seen that this is true since much of this tissue extends well into the interior of the gland. If it were a physiological entity, we would not find the "capsule" extend into these inner parts. Since dissections are made easy by the hypertrophy of this outer formation, it simply suggests that fibers of the same character have multiplied to such an extent that crowding has taken place and the gland is more readily moulded from its bed. Therefore we can agree with Zukerkandl and consider that the pathology is hypertrophy brought about by disease.

Further we must consider the pathology of the alveoli. The simple columnar epithelium become more or less flattened by the influence of infection. The excretory function is depreciated and there develops a condition which might be termed pathological retention. This in itself produced further crowding and influences the outer coat to greater hypertrophy in order to keep from bursting. We find in subacute and chronic prostatitis the varying stages of a thickened periphery. This thickened and hardened condition of the outer coat of the gland permits the entire mass to become well defined from other structures and to be quite easily separated, especially in the older, chronic forms.

TREATMENT.

These prostatic cases cannot be properly treated without definite knowledge of the foregone pathology. If we consider the treatment from this viewpoint, there are two methods:

Method No. 1: Here are placed all of the chronically sclerotic prostates. Whether the gland is of this type can be readily determined by digital rectal examination.

All of the chronic, sclerotic forms can be best treated by the two-stage enucleation method of Willis, with which all are familiar.

Method No. 2: Under this method is placed the subacute type of semi-soft prostatic disease which is neither amenable to, nor in proper pathological state for, the two-step enucleation method. It is the soft, large, pulpy feeling gland that is amenable to the treatment of this method, which cannot be enucleated en masse. Morcellation cannot be completely accomplished and when it is attempted the destruction of urethral and cystic tissue gives poor after-results, for the cicatrical tissue which forms of necessity is a bar to good results. Again it is this large soft or semi-soft gland that gives much pain, discomfort, interference with micturition, retention, obstruction and melancholy. These symptoms wear upon the patient and he becomes a wreck. These conditions can be determined by digital examination per rectum.

Just what to do with these cases was to me a problem, but after much consideration and observation the following course was decided upon:

The patient enters the hospital and for three days previous to the operation he is given some standard urinary antiseptic and plenty of water, and is kept quiet in bed. A liberal, meat-free diet is given and the bowels are kept open. On the fourth day suprapubic cystotomy is performed. Sometimes under local and sometimes under general anesthesia. The usual routine method of Willis is carefully followed, and the gaping bladder is stitched to the abdominal wall, which takes but a few moments. For the following three days the patient is given liquids for nourishment, and water very freely. The urinary antiseptic is continued with smaller doses of quinine sulphate. On the fourth day after operation hot boric acid solution irrigations are begun. This irrigation is accomplished through both catheters, namely, one enterng the bladder by the urethra, and one entering by the supra-pubic incision. Every day for two weeks this irrigation is continued until the draining fluid is clear. During this period the patient is returned to general house diet, and large quantities of water are administered. The patient is permitted to be up and about and to enjoy a moderate amount of exercise. A general tonic is usually given also.

While watching a goodly number of these cases under this technique I was gratified to learn that satisfactory results were forthcoming. The prostate gland would decrease to normal size and shape; the urine would become clear and all the pathological signs and symptoms would disappear. At the end of two weeks the catheters were withdrawn and the small supra-pubic aperture would close very quickly and the patients were discharged in perfect health.

Following are some of the cases treated in this manner:

Case I. M. M. H., 32, single, shoe-tacker.

Family History. Unimportant.

Past History: Has had 3 attacks of gonorrhea; last attack two years ago. Since these, continuous, watery discharge from urethra. Occasional attack of acute retention necessitating the use of the catheter. Between the attacks of retention he finds difficulty in starting the stream and dribbling. Some burning and smarting at the start and finish.

Physical Examination: Other organs, negative. *Local*: Meatus reveals slight, thin, cloudy, watery discharge. Smear and culture of this discharge showed no organisms. Three-glass urinary specimen showed shreds in all with cloudy urine. Digital examination per rectum revealed a large, soft prostate of even outline. Blood examination, negative. Wassermann reaction, negative.

Diagnosis: Chronic infiltrative prostatitis, secondary to recurrent gonorrhea.

Treatment: July 12, 1915 entered Nôtre Dame Hospital for treatment. Usual three-day preparation.

July 15, 1915. Supra-pubic cystotomy, under analgesia and amnesia. Three days after the operation daily bladder two-way irrigations were begun and continued for eight days, or until the drainage and irrigation had been clear for three days. Eighth day pubic catheter withdrawn and patient allowed up and about. Eleventh day urethral catheter withdrawn and voiding permitted. Fourteenth day discharged from the hospital. At this time the urine was perfectly clear and free from shreds by the four-glass method. General hygienic, dietetic and advisory principles outlined.

August 8, 1915. Four-glass tests made with negative results. At this time the stream was full; no difficulty of micturition. He felt well and vigorous and has remained so since.

Case II. M. J., referred by Dr. Kelso of Hillsboro, single, 51, farmer.

Family History: Unimportant.

Past History: Negative except for gonorrhea ten years ago.

Present Illness: Past five years thin, watery discharge from urethra.

Physical Examination: Other organs, negative. Old deformity of left hip. Local examination showed thin, watery discharge from urethra. Prostate, the size of a small orange, soft and regular in outline. No stricture. Smear of discharge revealed no organisms. Urine: four-glass specimen showed shreds in the first two, the last two clear Albumin, sl. trace. Sediment,—shreds of mucus, leucocytes.

Diagnosis: Sub-acute infiltrative prostatitis.

Treatment:

May 5, 1915, entered Nôtre Dame Hospital. Usual three-day urinary antiseptic treatment.

May 8, 1915, supra-pubic cystotomy and establishment of two way drainage. Three days later irrigation begun. Eighth day pubic catheter withdrawn. At this time patient was up and about and urine clear. Discharged on the 14th day with clear urine, prostate of normal size, firm and regular in contour, stream easy and full, no pain.

May 24, 1916, one year after operation, patient in perfect health with normal prostate and genito-urinary system in good condition. Four-glass specimen showed all urine clear.

Patient feels in perfect health and has just returned from a winter spent in the South.

Case III. M. S., Concord, N. H., 41, single, store-keeper.

Family History: Unimportant.

Past History: Repeated attacks of gonorrhea. Lues 3 years ago.

Present Illness: Past three years thin, watery urethral discharge. Some difficulty of micturition. slow in starting and dribbling. At times severe burning during the entire course.

Physical Examination: Copper spots over entire body surface. Heart and lungs, neg. Abdomen, neg. Sub-occipital, sub-mental, epitrochlear and inguinal glands enlarged. No ascites or edema. Reflexes normal, except suggestion of slight exaggeration of knee-jerks.

Local Examination: Thin, pale, watery discharge from urethra. Glands present on dorsum of penis. Four-glass specimen of urine showed shreds in all with cloudy urine. Prostate the size of an orange, soft, regular and tender. Smear of discharge revealed no organisms. Blood,—Wassermann reaction positive, Hgbn., 70% W. B. C. 15,400; R. B. S. 3,700,000. Def. Ct. Poly. 80, S. M. 15, L. M. 5. Urine-cloudy, shreds, sp. gr. 1026, acid, trace of albumin; no sugar; sediment, shreds of mucus and leucocytes with bladder epithelium.

Diagnosis: Sub-acute infiltrative prostatitis; lues.

Treatment: August 20, 1916 entered Nôtre Dame Hospital. Usual three-day urinary antiseptic treatment. August 23, 1916, supra-pubic cystotomy and establishment of two-way drainage. Three days later irrigation begun.

Eighth day, pubic catheter withdrawn. Twelfth day, urethral catheter withdrawn. Patient up and about since seventh day. Discharged on the fourteenth day with clear urine and micturition normal. Prostate well contracted, of normal size, and regular in contour. Says he feels better than for ten years past.

October 5, 1916. Reports in fine condition. Examination shows urethra normal and prostate normal in size, consistency and contour.

Note: After recovering from the operation antiluetic treatment was given. November 15, 1916, Wassermann reaction negative.

Case IV. (Referred by Dr. Kelso of Hillsboro). Mr. S., 34, mill operator.

Family History: Unimportant.

Past History: Gonorrhea 18 months ago. Persistent watery urethral discharge for the past year. Burning micturition during the entire course. Dribbling.

Physical Examination: Other organs, negative. Thin, watery discharge from meatus. Dr. Miller reports stricture in prostatic urethra. Prostate the size of an orange, soft, regular in contour. Smear of discharge revealed no organisms. Urine, —four-glass specimen showed shreds in all with cloudy urine, acid, sp. gr. 1026, trace of albumin, no sugar; sediment, shreds of mucus, pus cells, occasional red blood cell with crenation, bladder spithelium. Blood, Wassermann, reaction, negative, cystology, normal.

Diagnosis: Sub-acute infiltrative prostatitis.

Treatment: November 7, 1916, entered Nôtre Dame Hospital. After three-day urinary antiseptic treatment, on supra-pubic cystotomy, establishment of two way drainage. Divulsion of urethra. Three days later irrigation begun. On the 8th day pubic catheter withdrawn. Up and about. 11th day, urethral catheter withdrawn. 14th day, discharged. At this time urine clear by four-glass method. Micturition painless, stream normal, prostate well contracted, normal in size and contour. Says he feels better than for five years. Referred back to Dr. Kelso.

Seven selected cases have been operated on under this method, and in each instance the result has been most satisfactory. The melancholia so prevalent among this class of patients, disappears. They assume an attitude of contentment and well-being. The prostate early becomes normal in size, the urethral discharge ceases and there is comfortable and normal micturition.

It certainly seems that such results warrant a continuation of this plan of treatment. It ought to do much to help the old urethral discharge cases.

These cases should be well selected and a most careful and painstaking pre-operative examination made.

967 Elm Street.

PERSONAL OBSERVATIONS OF THE CARE OF THE WOUNDED IN THE GREAT EUROPEAN WAR.*

R. C. Bryan, M.D., F.A.C.S.,
Richmond, Va.

In an article, "The Surgical Care of Wounds in the European War," read at the forty-seventh annual meeting of the Medical Society of Virginia, October 24, 1916, I attempted to incorporate in the time allowed the experiences which I gathered from a rather active surgical service of four months' stay, about thirty miles back from the front at Juilly, during the summer of 1916. It is obviously impossible to record the many interesting phenomena arising from such an experience. Pathology is the same the world over, but etiology of the pathologic state differs. The one essential causative factor of the surgical cases we had was, gunshot wounds, or some manifestation of suddenly arrested momentum. It is not my desire to present to your attention the theory of ballistics, the trajectory of bullets, the foot pounds they possess, the heat they develop, nor the ricocheting and freak courses that they at times pursue. Nor is it my intention to consider the individual patient, his social condition, age, or character of work, or whether he had been injured by hand grenade, rifle ball, shrapnel ball, fragment of shrapnel shell, torpedo, foreign body, bayonet thrust, or with the high explosive shell. We are to consider that soldier only who presents for investigation and treatment some injury as the result of a penetrating foreign body, whether it be a simple wound or a compound, comminuted fracture with destructive lesions of the soft parts, in each instance practically always previously infected, and who comes under our observation some four or five days after the receipt of the injury. At the many hospitals which I had the privilege of visiting during my stay near the battle front, I saw as many different modes of treatment, each and all designed to combat infection which varied in degree and character, and which was evident as the result of great traumatic violence.

Some of the many means of treatment which I saw in use were, numerous small bags of salt laid upon the wound, probably to encourage osmosis, different preparations, of phenol, iodine, mercury, bichloride, gentian violet, methylene blue, Menciere's solution which has iodoform for its base, Sir Almoth Wright's solution, citrate of soda, magnesium sulphate, which we used only in Hospital B, hypertonic salt solution, and Dakin's solution which has been perfected into surgical technic by Dr. Alexis Carrel.

In an article appearing in the *Journal of the A. M. A.*, January 13, 1917, H. M. Lyle, of New York, elaborates freely about the properties and virtues of this solution, and I earnestly commend it to your surgical consideration. In this treatise the preparation of Dakin's solution, of the tubes, and irrigating tubes and can, is freely discussed, the technic of the introduction of these tubes, covered with turkish toweling, into the wounds is also taken up, as is the protection of the skin, the bacteriological control of the wound, the toilet of the wound, bone involvement, nerve-lesions, etc., which must come into consideration in the constant use of a solution designed to mathematically asepticise an intensely infected surface. This article is so complete and comprehensive in every detail that I shall not attempt to contribute any further surgical literature on the subject, particularly in the allotted time allowance, but shall devote my opportunities, as the title of my paper signifies, only to some rather disconnected personal observations of some of the few surgical features of this greatest of human conflicts.

I had the pleasure of spending one day at Chateau d' Anel with Dr. Lyle, and it happened on that occasion that Dr. Carrel, who was present, expressed himself freely that he considered from every standpoint that the question of sterilization of wounds was perfected, so much so that he proposed to abandon any further consideration of the question, development of technic, or changing the strength of the fluid. He believed that in Dakin's solution, with a daily microscopical investigation of the pus, the question of wound sterilization had been solved. Further that his hospital at Compeigne, but a few miles from the front, was to be abandoned and he and his assistants were to go to the front to work with Deage at Lepin, where they were to devote their entire time and energy to the consideration of shock.

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* Read at the 19th Annual Session of the Tri-State Medical Association, Durham, N. C., February 21, 1917.

I had the opportunity of visiting Carrel's hospital, Rond Royal, at Compeigne, the next day. I spent a day at this hospital. Carrel does not operate now, but Dr. Dehelly, the right hand man and operating surgeon, very kindly took us over the entire building, describing in detail the treatment of the cases from the time they are received, usually a few hours after the receipt of the injury, to the day of their departure. I saw cases in the varying stages of healing. I saw one case in which the wound loss was so great that twenty-five tubes were being used. I saw compound, comminuted fractures of the thigh immobilized in appropriate splints being bathed continuously by Dakin's solution. I saw the ultimate movable, soft, healthy scar resulting from a clean cicatrization. I saw a patient who had a compound, comminuted fracture of the thigh walking on the 44th day, with perfect union and a healthy wound. I saw extensive burns of the face, neck and hands from gasoline explosions in aeroplanes, and burns from the back-fire of sappers, soft, plastic and normal in six days after the receipt of the injury. I was shown by the courtesy of Dr. Dehelly color photographs, taken in a most delicate and artistic way, of the various stages of progressive healing and cicatrization of every character of wound from the small superficial injury to the large devastating wounds involving the entire shoulder girdle, characterized by extensive bone destruction and involvement of the soft parts. This progressive daily repair was most carefully noted, and the astonishing daily progress was unmistakably noticeable by this recorded photographic system. The outcome was so bewildering, incomprehensible and at variance with all our previous surgical ideas of wound-sterilization and restoration, that Dr. Hawley, of Bridgeport, Conn., and myself who were witnessing this incontestable illustration of the last word in surgical skill, were at a loss to say anything, or even to discuss what we had seen.

One interesting feature, which had been brought out by one of Dr. Carrel's assistants at Compeign, was a mathematical formula, something like Ambard's coefficient for urea excretion, by means of which the computation of the rate of repair of the wound could be accurately foretold, and the day on which the wound would heal could be accurately figured out. The principle of the formula is based on the number of square centimeters of tissue-loss which the soldier has sustained. The depth of the wound, the character and location, bone involvement, or injuries to the soft parts have no influence upon the reckonings, and every wound is treated in the same way.

It is interesting to note that there is no skin grafting done upon the large raw surfaces. Although grafting at first would apparently hasten recovery, by this mathematical equation it has been demonstrated to delay repair, so that the surgeons have found out by experience that the application of skin was unnecessary and in every instance was contraindicated.

Since my return there has been a new treatment brought out for burns which has received considerable attention. I refer to that paraffine or waxy product called "Ambrine." This looks like a cake of cocoa, about the same shape and size, and a little lighter in color. A block is cut off (as much as is desired), put in a closed vessel and then placed in a water-bath and the heat continued until the wax is well-melted. It is then poured, or better sprayed, upon the surface. It soon cools and immediately forms a thorough protectant which adheres gently, is not disturbed by the movement of the parts, or the wrinkling of the tissue, excludes the air and exercises continuously its beneficent medical influence upon the raw surface.

I believe this preparation was first developed by Dr. Barthe de Sandforth, who states that he has been working for some twenty years in perfecting this medication, and has been able to teach only one other man how to prepare it satisfactorily. The temperature at which it may be applied is 158° Fahr., which paradoxically on the burned, raw surface gives no pain, but may cause considerable discomfort when dropped upon the normal skin. It is essential at all times that there be no water upon the surface upon which this paraffine preparation is to be applied. For this reason after the wound has been nicely cleansed and the pus removed by irrigation, the wound is thoroughly dried by means of an electric hot-air drier and the surface is then ready for the application of the wax. While it is still hot strips of thin cotton batting are put over the wax, the ambrine is again sprayed on the batting and more cotton is put on, and the whole is kept in place with a loosely applied bandage. This air exclusion treatment is certainly at variance with some of our former treatments of extensive burns, particularly that form in which the parts were exposed to the open air so that in the entire process of granulation no covering or dressing comes in direct contact with the burned surface. Many of us who have had the opportunity to treat burns in this old way recall the cicatrization and suppuration by the open air treatment so that I venture to say we will be glad to know about a treatment which claims to do away with cicatricial formation and consequent deformity. Apparently, then, this is the ideal method of the treatment of burns of a lesser degree of superficial excoriations and lacerations. Those severe burns of the deeper structures, infected, with considerable tissue loss, and certainly those in which the bone is involved, should be treated only by the Carrel solution. I have had the opportunity to use ambrine but once since my return, on a very small superficial burn, and it worked well, so I am not in a position to say from personal experience anything of its value in deep burns up to the third degree.

I had the opportunity during the last summer to use La Clainche and Vallee's serum, which is of a polyvalent character designed particularly for use in those distressing cases of compound, comminuted fractures in which the fragmentation has been of the severest character, in which the infection is profound and mixed, and which do not respond to the usual methods of antiseptic applications, or irrigations. This treatment had been in use before the development of the Carrel technic. I remember one case in which a shrapnel ball entered the posterior aspect of the thigh, traversed the head of the femur and emerged anteriorly, shattering the bone completely; many small spicules of bone were coming away for weeks, sinuses established themselves; there was a low degree of sepsis constantly present. Use of this serum in this particular instance was certainly of benefit. A few drops of the solution is put upon a wick of gauze which is gently packed into the suppurating sinus, or sinuses, and removed daily. When a new application is carried out, the wound may be irrigated with a saline solution if suppurating very freely. Apparently, however, the simple application of the polyvalent serum with no irrigation is preferable. No significance is attached to the character of the germ present, the multiform constituents of the serum being designed to combat every form of germ so that microscopical controls are not necessary.

The sickening, devastating wounds of the face, with loss of one-half or more of the organs of special sense, were not treated at our hospital but were sent to appropriate institutions in Paris where surgeons, trained in plastic surgery, by a series of operations restored in a most wonderful way this loss of substance. Not only were photographs taken at the time of the operation, but also to show the daily progress of the wound, and in many instances wax models in lifelike coloring were accurately modeled to show just the extent and character of the wound and its varying stages of repair. At Val de Grace, one of the larger municipal hospitals of Paris, the wing of one ward is given up to this cosmetic repair work, and it is here that Dr. Morestin accomplished wonderful results in plastic surgery. Also at the American Ambulance A, Neuilly, they have been peculiarly successful in this class of work, and it has been my fortune to see cases in reparation there which had been operated on by Dr. Jos. P. Hutchinson and Dr. Chas. A. Powers. There is certainly no class of injury that taxes the skill and ingenuity of the well equipped surgeon such as this variety of horrible mutilations.

It is not my intention to dwell upon shell shock, nervous diseases, or medical cases which arise from the constant strain, or improper life in the trenches. Hospitals designed for these diseases, are scattered generously over France. I believe 8,000 are now extant, many private homes, hotels and chateaus having been requisitioned. I understand that Menier, the chocolate king, has given his handsome chateau for those who have lost both arms and both legs. There were 80 of these human trunks there at one time. At the Hospital Reuilly, in the heart of Paris, they have some 300 blind soldiers who are starting life afresh in learning trades, carpet-weaving, basket-making, manufacture of buckets, tubs, barrels, repairing automobiles, even the manufacture of carburettors, which I learn require 34 separate parts, piano tuning, instrument making, etc. There was a hush and silence in the different mechanical halls among the working men, which was oppressive; and to those who are not accustomed to seeing men grope about in the broad daylight to find by sense of touch only what they were looking for, was as unique as it was sad and depressing.

The spirit that actuates the French is one of resolution and determination; the heartless destruction of their homes and land has been checked. Warfare is no longer "on" the ground, but below, and above the ground. To make substantial gains and dislodge the enemy can be attained only by supreme efforts and great sacrifice. It is a war of attrition, and in the grinding away the smaller body will give out first, but when? No one, I venture to say, can accurately predict.

Have you interested the young physicians in your community, fresh from the hospital, in the imminent need of medical officers for the army and the navy?

A HERNIOPLASTY RETRACTOR*.

Carl R. Steinke, M. D.

Visiting Surgeon to The Akron City Hospital; Formerly
Instructor in Surgery, University of Pennsylvania
School of Medicine.

Akron, Ohio.

The retractor herein described has proven to be a valuable adjunct in the performance of hernioplasty.

Figure 1 illustrates the retractor closed and fully open. A and A′ are set screws preventing any slipping of the sides after pulling out and setting in position. B and B′ are cord retainers over which the spermatic cord is placed while the tips are approximated, after which the tips are separated, thus drawing the cord taut (figs. 2 and 3). C and D represent the extreme positions at which B and B′, respectively, may be placed. This retractor can be used well in the Fergusson, Bassini or Halsted technic for inguinal hernia, Ruggi's inguinal approach for the radical cure of femoral hernia, and as a convenient retractor in other incisions.

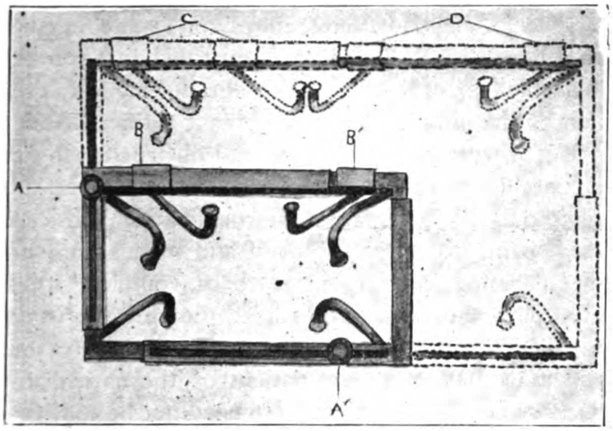

Fig. 1. Herniotomy retractor in its extremes. The shaded drawing represents the instrument closed, 3½ by 2⅛ inches over all. The broken lines outline the instrument fully opened, 5½ by 3½ inches over all, with 3¾ by 2 inches retracting space. A and A′ represent the set screws which hold the sides from slipping after the instrument is set in position. B and B′ are the spermatic cord retainers over which the cord is laid. C and D represent the extremes to which B and B′ may be utilized.

Figure 2 shows the retractor in position with the blades beneath the skin. If to advantage in a given case, the external oblique also may be retracted. A is the ilio-inguinal nerve retracted with the spermatic cord D. B is the divided external oblique muscle. C is the internal oblique and transversalis muscles.

Figure 3 shows a further step in the operation. E is the spine of the pubis illustrating how the stitches are carried well down thereto, making a solid closure. The hemostat was applied to show more clearly the shelving edge of Poupart's ligament.

The advantages of the retractor are:

1. It simplifies the operation by doing away with the retracting assistance, thus allowing the assistant to help with the suturing.
2. It gives a much better exposure and is of special service in large and adherent types of hernia.

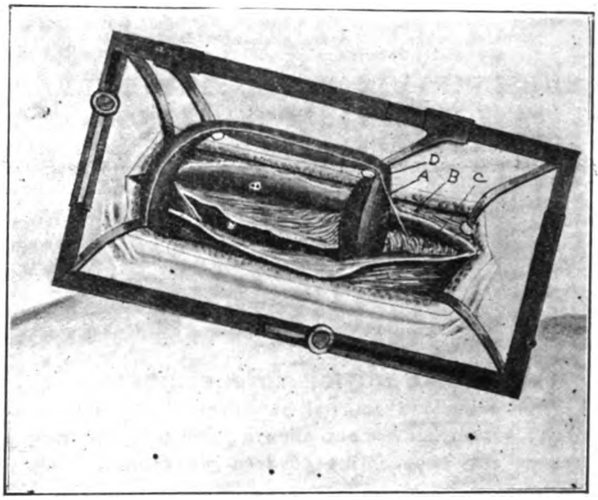

Fig. 2. The retractor in position. A is the ilio-inguinal nerve, B the external oblique muscle, C the internal oblique and transversalis muscles, and D the spermatic cord.

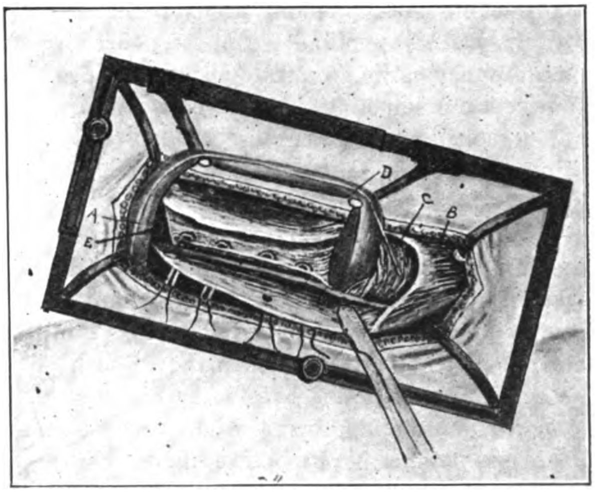

Fig. 3. Further step in the operation with the internal oblique and transversalis muscles, forming the conjoined tendon sutured to Poupart's ligament. E is the spine of the pubis with the sutures running close to it. The other letters represent the same as in Fig. 2.

3. It keeps the spermatic cord out of the way, thus doing away with tape retractors.
4. In Ruggi's inguinal operation for femoral hernia it exposes and retracts the cord.

406 Ohio Building.

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* Presented before the Summit County Medical Society, April 4, 1916.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

New York, August, 1917.

WOUND DIPHTHERIA.

Of much practical importance, it seems to us, is the interesting clinical and bibliographic study of wound diphtheria, published in this issue.

Infections of surgical wounds by Klebs-Loeffler bacilli, while not common, probably occur much oftener than is generally supposed, because the condition may easily go unrecognized. Indeed, such an infection is sometimes the cause of a death which the surgeon explains otherwise or may fail to explain.

That wound diphtheria is not always promptly recognizable is not only because it is a rather unfamiliar phenomenon but also, and chiefly, because its manifestations are not constant or characteristic. This is emphasized by Levy, who also points out that the patient may be suddenly overwhelmed by the accumulating toxins before the changes in the previously normal-appearing wound are accounted for or, sometimes, even before these changes attract serious attention. This, in fact, is the chief value of his communication: it urges the necessity of suspecting the possibility of a diphtherial infection of a wound, when a whitish, grayish, or yellow discoloration or membrane, an otherwise unexplainable necrosis, or an unusual odor, appears. This is important, not only because of the danger of transmitting such an infection to others, but also for the patient's sake, since within a day, or two, after the wound change attracts attention the patient, if a child, may sink into a condition beyond restoration even by vigorous antitoxin treatment.

In hospitals, especially in children's wards, the occurrence of a case of throat diphtheria should be a matter of concern not only to the physician or pediatrist but also to the surgeon. Diphtheria carriers are not few and on this account, too, the hospital surgeon should be on the alert for this serious wound contamination. Its possibility should not be lost sight of whenever he is confronted with an unusual wound appearance.—W. M. B.

COLOSTOMY FOR NON-OBSTRUCTING BOWEL CANCER.

In the face of a complete intestinal obstruction there is no contraindication to operation no matter what the age and the condition of the patient (unless he be, beyond doubt, moribund); and in such an emergency the surgeon is justified in performing whatever operation the conditions suggest, even if it be the infliction of a permanent artificial outlet.

But where there is only partial obstruction by an inoperable malignant neoplasm, that is, when the symptoms are obstipation, or constipation and diarrhea, pain, discharge of blood and mucus, and not the alarming and urgent state of complete intestinal blockage, then, we protest, the surgeon is not justified in making a colostomy without the previous full appreciation by the patient of the nature and purpose of the operation. He need not be told that he has an incurable cancer, but he should be told, if his mind is clear, that he will have an intestinal outlet that will discharge feces upon his abdomen as long as he lives, and he should be allowed to decide himself whether he is willing to accept what the surgeon can give him in exchange for what he takes away.

No matter by what method it is constructed, neither a sacral nor an abdominal "anus" (as we euphemistically call such a bowel outlet) can be depended upon to be controllable. This is especially true when the colostomy is in an individual whose tissues are wasting with advancing cachexia. There is no more pitiable condition than that of an old person slowly dying of a cancer of the bowel, inflicted also with the stench and filth of feces spilling upon his emaciated abdomen, and begging for the closure of the outlet which he thought was but temporary. It is especially pitiable in the home of the poor, unable to secure adequate nursing and sometimes unable even to provide the large amount of dressing material required. And it is, of course, the poor in our hospital wards upon whom the surgeon is most likely to perform a colostomy without full explanation of its consequences.—W. M. B.

DOCTORS OF AMERICA WAKE UP.

Doctors frequently remark *"when my country needs me, I will offer my services"*.

There never was a time in the history of America when your country needed you more and it is calling you NOW, so why not live up to your expression and offer the Government your services at this critical period?

An army without an adequate and well trained Medical Corps, is as impotent as it would be without ammunition. The services of thousands of physicians are needed NOW as Regimental Surgeons, Surgeons for Field, Evacuation and Base Hospitals, Training Camps and on Transports.

While the response from the medical profession for Commissions in the Medical Reserve Corps of the United States Army has been encouraging, many have been deterred from offering their services to the Government at this critical moment on account of the false reports appearing in the daily press regarding the number of physicians killed in action.

In reality, in nearly three years or since the beginning of the war, to June 25th, 1917, there were only 195 doctors killed on the entire Western Front. These figures are authentic, coming from no less an authority than Col. T. H. Goodwin of the British Medical Corps.

In this real hour of need, we are sure that the patriotism of the medical profession of this country will be the stimulus that will induce doctors to come forward and apply for commissions in the Medical Reserve Corps.

An application blank will be found in this issue of the journal. When properly filled out, sworn to and accompanied by two letters of recommendation and a County Clerk's certificate that you are a licensed practitioner, it should be forwarded to your nearest Examining Board. If you are not acquainted with the location of such a Board, this office would be glad to inform you. J. MacD.

Have YOU interested the young physicians in your community, fresh from the hospital, in the medical needs of the Army and the Navy?

The Army and Navy need more doctors—lots of them! Have you offered your services?

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

Two Surgical Problems.

The recently elected President of the American Medical Association, Dr. Arthur D. Bevan read a paper before the Section of Surgery on the problem of unnecessary operations and of incompetent surgeons. His treatment of the subject was exceedingly conservative, although possibly the public acknowledgment of the existence of these two defects might be regarded as somewhat radical.

It is exceedingly promising that a large medical organization consciously and willingly views its problems, defines them and attacks them. The knowledge that unnecessary operations have been performed has been more or less general but the exactness and careful technic of surgery have so minimized the inherent dangers that the profession has not strongly emphasized the undesirability of the rush to the unrequired scalpel.

For many years surgery has advanced exceedingly rapidly and to many, apparently has outstripped medicine. New surgical fields have been explored and operative procedures have been perfected to meet the requirements of surgery in all parts of the body.

Many thousands of persons have undergone operations for the relief of conditions from which they would have died during a previous generation. The very growth and expansiveness of surgery are responsible for its shortcomings. Incompetents have rushed in where wiser heads would have felt the restraint of conscience. Results which might have been satisfactory have been complicated because of imperfect technic. Opportunities for the training of surgeons has been inadequate and every tyro has felt himself competent to attempt difficult operations.

It is unfortunate that the commercial returns of surgery need be regarded as an element contributing to the conditions which Dr. Bevan deprecates. Many tonsils have been removed where actual need could scarcely be justified. Normal appendices have seen the light of day as the result of bad judgment. Ovaries have been removed for conditions for which they were not responsible, as the result of ignorance.

It is timely that the medical profession itself should take cognizance of surgery as it exists today and make an effective investigation of the therapeutic results, the mortality, the probability of complications, the possibilities of palliation, relapses or consequent impairment of other functions. An evaluation of surgery would be immensely valuable as a check to unwarranted and imperfect operations.

Dr. Bevan suggests, for example, a study of intestinal stasis and its surgical therapy. He indicates that the study should be made by a group of men such as internists, neurologists, physiologists, pathologists, roentgenologists and surgeons. The opinion of the group would certainly be far more conclusive than the judgment of a single individual with a biased point of view.

It is obvious that if group diagnostics could be practiced and diagnostic clinics were developed to afford this opportunity, ante operation, fewer unnecessary operations would be performed.

The problem of incompetent surgeons is largely one of education. It may be necessary for medical institutions to provide for the granting of a degree in medicine and one in surgery, making somewhat different provisions for the two degrees as is already provided in part in England. Practical surgical work, surgical interneship, and an apprenticeship in surgery would go a long way toward removing present weaknesses arising from the practice of surgical incompetents.

Fortunately for the reputation of the medical profession the number of incompetents is not alarming. The surgical profession is rich with conscientious, honest, well-trained, devoted and self-sacrificing men and women whose noble efforts redound to the credit of the profession. They have brought surgery to the high estate in which it is now to be found. This fact, however, should not serve to preclude a careful study of the shortcomings of surgery with a view to removing them. The profession must purge itself of those who are ignorant and dishonest as well as those whose judgment lacks balance. It is far better for the profession to have its faults pointed out by one of its own members and to have them attacked by its own members than to permit, with knowledge, the continuance of wretched defects which impede its progress. The subject is too important to be neglected, too delicate to be handled carelessly, too significant to be ignored. Modern surgery is sufficiently vigorous to face its own problems and to solve them.

Your country is at war! Are YOU going to help it?

Book Reviews

A Practical Treatise on Fractures and Dislocations. By LEWIS A. STIMSON, B.A., M.D., LL.D., Professor of Surgery, Cornell University Medical College; Consulting Surgeon, New York and Bellevue Hospitals, etc. *Eighth Edition.* Octavo; 946 pages; 475 illustrations and 39 plates. New York and Philadelphia: LEA & FEBIGER, 1917. $6.00.

In the review of each new edition of this standard work we refer to it as a "classic"; and, indeed, we know no modern medical treatise more consistently deserving of that title. It is more than authoritative; it is altogether complete. In the preparation of each edition Stimson combs the literature critically and with exceeding care. His work always contains references to almost every contribution worth quoting; it includes nothing unworthy of quotation; and all references are presented with admirable critique. His painstaking thoroughness is remarkable in a man of his years; it is a severe example for younger and, most of them, more careless authors.

Since the last edition (1912) Stimson has twice visited the military hospitals of France and he has included in this edition much that he saw there of the recent postural and other modifications of the treatment of compound fractures. Indeed, the chief changes in his book are in the section on treatment. Concerning the operative fixation of fractures Stimson has crystallized his views. He admits a limited field for the Lane plate, but still objects, very properly, we think, to the employment of non-absorbable internal fixation appliances when they can be avoided. He describes as ingenious Hawley's temporary wire loop fixation method. We are at a loss to understand why he fails to illustrate and describe Hawley's still more ingeniouh fracture table. The traction method for reducing femur fractures illustrated on page 405 seems to us much inferior to Hawley's.

In the section on dislocations Stimson has revised chiefly his discussion of congenital dislocation of the shoulder and dislocations due to paralysis, and he has added to these "birth dislocations" and "posterior subluxations of infancy," the latter due to palsy. It is interesting to note that while in previous editions Stimson, like Hamilton and others, denied the possibility of subluxation of the shoulder except as an accompaniment of palsy or arthropathy, in this edition he admits the cases reported by Ross and by Brickner as illustrating purely traumatic forward subluxation of the shoulder. He has introduced a description, from Hazlehurst's study of the injury, of dislocation of the major cornu of the hyoid bone.

The Breast: Its Anomalies, Its Diseases, and Their Treatment. By JOHN B. DEAVER, M.D., LL.D., Sc.D., Professor of the Practice of Surgery, University of Pennsylvania; Surgeon-in-Chief to the German Hospital; Visiting Surgeon to the Hospital of the University of Pennsylvania; Consulting Surgeon to the Germantown, The Philadelphia General, St. Agnes and Mount Sinai Hospitals, Philadelphia; and JOSEPH MCFARLAND, M.D., Sc.D., Professor of Pathology and Bacteriology in the Medical Department of the University of Pennsylvania; Pathologist to the Philadelphia General Hospital. Octavo; 724 pages; illustrated; Philadelphia: P. BLAKISTON'S SON & Co., 1917. Price, $9.00.

This book is a distinct contribution to medical literature. It reminds one very much of Cullen's recent monograph on the Umbilicus and its Diseases for its comprehensive scope and completeness and the large material upon which the text is based. Particularly valuable are the chapters on the congenital and acquired anomalies, which are profusely enough illustrated and embrace every known type of breast aberration. The chapters on tumors, especially carcinoma, are very illuminating, and both surgical treatment and non-operative therapy find ample space for description and discussion. The question of early diagnosis receives special emphasis. An extensive bibliography has been drawn upon by the authors and is appended to the respective chapters.

The Newer Methods of Blood and Urine Chemistry. By R. B. H. Gradwohl, M.D., Director of the Pasteur Institute of St. Louis, and the Gradwohl Biological Laboratories, St. Louis, and A. T. Blavis, Assistant in the same; Sometime Technician in Pathological Chemical Laboratories, New York Post-Graduate Medical School, etc., etc. Octavo; 240 pages; 65 illustrations and four color plates. St. Louis: C. V. Mosby Company, 1917.

Here is a book that is most timely. In the past few years, chemists have been most active in devising new tests, especially upon the blood, which have aided us especially in the prognosis and treatment of certain diseases, especially diabetes, nephritis and the conditions associated with acidosis. We refer, for instance, to such tests as the determination of the carbon dioxid tension of the alveolar air, the hydrogen-ion concentration of the blood, uric acid determinations, tests for non-protein nitrogen, quantitative tests for blood sugar, etc. Incidentally, it should be a maker of pride that most of these newer researches are of American origin. To the uninitiated the comprehension of these newer methods has been difficult owing to the extraordinary activity with which this work has been pursued and the multiplicity of the publications. The authors, therefore, deserve much praise for having "boiled down" the immense data in a book of reasonable dimensions. Moreover, they have done their work well. The explanations are clear, comprehensive and readily understandable to those who have only a working knowledge of chemistry. Moreover, the reader is not troubled by a multiplicity of methods, but is furnished with only the one that the authors deem best. Furthermore, if the reader wishes to pursue his investigations further, numerous references are added to aid him. From every point of view this book deserves a wide success.

Handbook of Suggestive Therapeutics, Allied Hypnotism, Psychic Science, a manual of practical psychotherapy, designed especially for the practitioner of Medicine, Surgery and Dentistry. By Henry S. Munro, M.D., Omaha, Neb. *Fourth Edition,* Revised and Enlarged. Octavo; 481 pages. St. Louis: C. V. Mosby Company, 1917.

Despite the ambitious title, this book contains nothing more than an exposition of the general principles of ordinary suggestion as practiced by every sensible physician, with a little hypnotism thrown in. Although the author speaks everywhere of "my methods," we have failed to discover any originality in any of the methods which he describes. The text is verbiose to a degree, and the brand of psychology displayed is more applicable to the lay than to the professional understanding. The author bothers himself very little with diagnosis, but dilates upon his achievements and the importance of suggestion interminably. We have found little to inspire us in the perusal of this book.

The Diagnosis and Treatment of Abnormalities of Myocardial function, with special reference to the use of graphic methods. By T. Stuart Hart, A.M., M.D., Assistant Professor of Clinical Medicine in the College of Physicians and Surgeons, Columbia University; Visiting Physician to the Presbyterian Hospital in the City of New York. Octavo; 320 pages; 248 engravings, 240 of which are original. New York: The Rebman Company, 1917.

This is a book that we have been looking for for some time. The majority of the books that have been written upon the newer phases of cardiac pathological physiology are written in a manner too difficult for any but special workers in this subject to comprehend or are devoted to certain specialized spheres. Here is a book, however, that is written in understandable English and in which the clinical as well as the laboratory aspects of the subject are emphasized. It is therefore exactly the kind of work that we can recommend for beginners in this complicated and important field. We have only one criticism to make. In subsequent editions we suggest that the electrocardigrams or polygrams be placed in or opposite the page of explanatory text. This will simplify the reading immeasurably.

Progress in Surgery

A Résumé of Recent Literature.

On Lung Abscess As a Sequel to Tonsillectomy.

Ira Frank, Chicago. *The Laryngoscope,* June, 1917.

Frank reports three cases of lung abscess in adults following tonsillectomy. He points out that the operations were done skilfully and thinks that faulty technique plays an important role in the causation of the condition. From a questionnaire sent to a number of laryngologists, internists and surgeons he concludes:

The majority of these cases occur after operations under general anesthesia, in young adults between twenty and thirty-five.

In the three cases reported examination revealed incomplete or destructive operative results. Two gave a history of post-operative bleeding.

The majority of the lessons are aspiratory in origin, as evidenced by the location, the ease of aspiration, the occurrence of single abscesses in practically every case, the predominence of the complications the free clinics and charity hospitals, and, finally, the number of analogous conditions that can cause lung abscess in no other way. They are the result of pneumonia, of lobar, bronchial or focal type, induced by either the anesthetic, aspiration or septic embolism. The greater number are doubtless due to the second factor and are therefore largely preventable.

A more general use of local anesthesia for tonsil surgery, the abolishment of rapid tissue destroying operations and a respectful attitude toward hemorrhage and the secretions of the operative field will do much to relieve the surgeon of serious liability.

A Case of a Rare Foreign Body in the Oral Cavity.

John L. Lougee, Boston. *The Laryngoscope,* June, 1917.

A child of six was bought to the author on account of an impediment of speech and a foul breath. At the age of two it was supposed to have swallowed or inhaled a foreign body. No evidence of it could be found at the time. For some weeks the boy had a sore mouth; the saliva was blood stained and he refused to eat. He was well for two years when the mother noticed the speech defect and the foul breath. No cause could be found at the time. This persisted for two years when the author was consulted. He noticed an extreme mobility of the tongue. It was found that the frenum had been entirely severed and that there was a necrotic area on the floor of the mouth of the size of a dime. A metallic object which proved to be a ring was encircling the tongue and was completely buried in the tissues. The ring was cut and removed. Complete recovery.

Fibroma of the Left Nasal Chamber with Extension into the Post-Nasal Fossa. Report of a Case.

Thomas Chew Worthington, Baltimore, Md. *The Laryngoscope,* June, 1917.

This was a fibroma durum of naso-pharynx springing from the sphenoid and filling the left side of the nose, eroding the septum and the external nasal wall. Several attempts made to remove it under general anesthesia were only partly successful owing to extensive hemorrhage. Finally under X-ray treatment it disappeared. Up to the time of the patient's death, ten years later it had not come back. Death was due to nephritis from alcoholism and was in no way connected with the growth.

The Removal of Tonsils as a Prophylactic Measure in all Children of Four Years of Age.

Richard W. Perry, Seattle, Wash. *The Laryngoscope,* June, 1917.

The author takes the radical position that all tonsils in all children should be removed as a prophylactic measure. He holds that the tonsil is a lymph gland that has broken through its capsule and is exposed to the infections al-

Progress in Surgery

A Résumé of Recent Literature.

Studies in the Physiology and Pathology of the Stomach after Gastro-Enterostomy.

A. O. Wilensky and B. B. Crohor. New York: *American Journal of Medical Sciences,* June, 1917.

The author studied 37 cases of gastro-enterostomy with pyloric exclusion by means of test meals, kymographic tracings, according to the methods of Cannon and Carlson, and *x*-rays. They divide their cases into three groups: 1. Cases that are apparently cured; there were 11 such. 2. Cases, 14 in number, in which gastric and other abdominal symptoms are present following the operation. 3. Cases, 7 in number, in which symptoms and signs of either gastro-jejunal ulcer or of contraction of the stoma are present. In the last two groups profound changes in the secretion and peristalsis are present, and nearly all show greater or less retention of stomach contents. The authors hold that the prevalent opinion concerning the harmlessness of gastro-enterostomy as regards function of the stomach must be revised. In only a minority of the cases does the normal state of functional activity return. They believe the pyloric exclusion plays some rôle in the causation of the above phenomena, but to what degree cannot be estimated. They also warn against the so-called "concession operation," i. e., the performance of a gastro-enterostomy when no definite lesion is found in the stomach.

Diverticulum of the Duodenum, with a Report of a Case Diagnosed During Life and successfully operated on.

S. Basch, *American Journal of Medical Sciences,* June, 1917.

The patient suffered from gastric symptoms for years, mainly those associated with hyperacidity. With the *x*-ray a persistent shadow was noted on the third postern of the duodenum, which Basch proved to his satisfaction was a duodenal diverticulum. At operation, the diverticulum was found and successfully removed. It measured 3x3x4 cm., showed normal tissues and was regarded by the pathologist as congenital in origin. The patient was decidedly improved by the operation. Basch reviews all the hitherto recorded cases.

Splenectomy in the Anemias and Other Blood States Associated with Enlargement of Spleen and Liver.

William D. Haggard, Nashville. *Journal of the American Medical Association,* July 14, 1917.

After describing the functions of the spleen as far as known and stating the presumed cause of splenic anemia, Haggard reviews the conditions in which splenectomy is indicated or has been used, other methods having been ineffective. As regards the important question of the operation in pernicious anemia he says the best results seem to have been obtained in persons below 50 who have had the disease less than a year, in whom the blood picture is fairly good and the spleen is moderately enlarged. Mental, cerebral and spinal cord symptoms are distinct contraindications, and the presence of an aplastic bone marrow is equally forbidding. Hemolytic jaundice is the most promising of all conditions that are benefited by splenectomy and he suggests that certain cases of so-called Hanot's hypertrophic cirrhosis in young life that last a number of years may be really acquired hemolytic jaundice, as Mayo suggests. All chronically enlarged spleens producing symptoms should be exhaustively investigated to show why they should not be removed.

The Relation of the Iliohypogastric Nerve to the Radical Cure of Inguinal Hernia.

A. V. Moschcowitz and Harold Nenhof, New York. *Annals of Surgery,* July, 1917.

These investigators have demonstrated experimentally that that portion of the iliohypogastric nerve exposed in an operation for inguinal hernia contains no motor fibers but is here purely sensory. Division of the nerve in this field will therefore cause no muscle atraphy and will not affect the result of the operation. Division of the nerve here will produce, however, a localized anethseia; and inclusion of the nerve in a suture may cause neuralgia.

Penetrating Wounds of the Abdomen.

T. C. English, Saloniki. *Lancet,* Oct. 28, 1916.

In his experiences at the front, English concludes, as so many others in previous wars have before him, that unless perfect facilities are at hand, it is better to treat perforating wounds of the abdomen expectantly. When the patient's condition has improved sufficiently, then he is transported to the base hospital, where operation is performed.

Distal Osteoporosis of the Upper Extremity.

D. J. Marton, Chevy Chase. *New York Medical Journal,* July 7, 1917.

1. In a series of cases presenting a septic compound fracture of the bones of the forearm or of the carpal area, treated with the arm in a pendent position, a diffuse progressive decalcification involving all the bones in the distal extremity of the part and beyond the inflammatory zone, was disclosed, becoming quite apparent about three weeks after the time of injury especially in the cancellous structures, the carpal bones, and ends of the long bones.

2. Changes in soft structures were associated, first appearing as a marked edema and passive congestion of the extremity which continued as long as the wounded part remained acutely inflamed and with its subsidence showed marked retrogressive changes, atrophy, and deterioration of the various structures.

3. The process is distinctly the result of prolonged hypostasis, due to venous constriction in the wounded area and the action of gravity on the circulation of the pendent arm. The changes are produced by impairment of nourishment of the tissues of the extremity and catabolic activity stimulated by the irritation afforded by the accumulation of waste and toxic products. The nature of the disturbing factor indicates the use of the elevated position not only to overcome, but also to guard against, the presence of this condition.

Experience with the Paraffin Dressing for Burns.

George E. Burdick. *The International Journal of Surgery,* June, 1917.

The material selected for dressing must be of a low melting point and, at the same time, an unfavorable medicine for the growth of bacteria. A preparation known as parresine fulfils these requirements.

The wound is to be thoroughly cleansed with Dakin's solution or with chlorazene. The wound is dried by means of an hot air electric drier; the parresine is then applie *hot*—130° to 150° F.—preferably through an atomizer. A thin strip of gauze is now laid over to wax and a second layer of hot wax applied. This second layer becomes dry and firm and a gauze dressing is placed over the entire wound. The entire dressing is removed daily, the wound irrigated and the same dressing put on.

This treatment may be employed for all burns, new or old.

Neurotization of Paralyzed Muscles by Implantation of Motor Nerves.

J. C. A. Gerster and W. C. Cunningham, New York, *Medical Record,* August 11, 1917.

The author deprived the gluteal hamstring muscles in rabbits of their blood supply. The anterior tibial nerve was divided close to the knee and implanted into the paralyzed muscle belly. In three animals, stimulation of the implanted nerve one year later provoked contraction of the previously paralyzed muscle. Histological sections showed branchings of the paralyzed nerve as well as nerve endings within the muscle. It seems, therefore, well proven that a recently paralyzed muscle can be innervated by implantation of a motor nerve.

APPLICATION FOR APPOINTMENT
IN THE
MEDICAL RESERVE CORPS, U. S. ARMY

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........................, 191

To the SURGEON GENERAL, U. S. Army,
Washington, D. C.

Sir:

I hereby make application to be examined for appointment in the Medical Reserve Corps, U. S. Army, and inclose testimonials as to my character and habits. *

I certify that to the best of my knowledge and belief I am laboring under no mental or physical infirmity or disability which can interfere with the efficient discharge of any duty which may be required of me if appointed in the Medical Reserve Corps, U. S. Army, and that the answers given to the interrogatories below are true and correct in every respect.

I furthermore state my willingness to proceed to such point for examination as may be designated by the Surgeon General, with the understanding that the journey entailed thereby must be made at my own expense.

INTERROGATORIES.

1. What is your name in full (including your full middle name)?

2. What was the date of your birth?

3. Where were you born? (Give State and city or county; if foreign born, give country.)

4. When and where were you naturalized? (For applicants of alien birth only.)

5. Are you married or single? 6. Have you any minor children; if so, how many?

7. What is your height, in inches? 8. Your weight, in pounds?

9. Give the nature and dates of all serious sicknesses and injuries which you have suffered?

10. If either parent or brother or sister has died, state cause and age in each case:

11. Do you use intoxicating liquors or narcotics; if so, to what extent?

12. Have you found your health or habits to interfere with your success in civil life?

13. What academy, high school, college, or university have you attended? State periods of attendance from year to year, and whether you were graduated, giving date or dates of graduation:

14. Name any other educational advantages you have had, such as private tuition, foreign travel, etc.:

15. Give all literary or scientific degrees you have taken, if any, names of institutions granting them, and dates:

16. With what ancient or modern languages or branches of science are you acquainted?

***Testimonials as to character and habits from at least two reputable persons must accompany this application. Political recommendations are not necessary.**

17. How many courses of lectures have you attended? Names of colleges and dates:

18. When and where were you graduated in medicine?

19. Have you been before a State examining board? If so, state when, where and with what result: *

20. Are you a member of any State medical society? If so, give its name:

21. Have you had service in a hospital? If so, state where and in what capacity, giving inclusive dates of each kind of service:

22. What clinical experience have you had in dispensary or private practice?

23. Have you paid particular attention to any specialty in medicine; if so, what branch?

24. What opportunities for instruction or practice in operative surgery have you had?

25. Have you previously been an applicant for entry into the United States service? If so, state when, where, and with what result (if rejected state why):

26. Are you a member of the organized militia? If so, state with what organization and in what capacity:

27. Have you been in the military or naval service of the United States as cadet or otherwise? If so, give inclusive dates of service with each organization, designating it:

28. What occupation, if any, have you followed other than that of student or practitioner?

29. What is your present post-office address?

30. What is your permanent residence?

31. (Signature of applicant) ....

32. The correctness of all the statements made above was subscribed and sworn to by the applicant before me this day of , 191 .

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* This application must be accompanied by a certificate from the proper official that the applicant is duly registered to practice medicine in the State in which he resides.

Form 149
W.D., S.G.O.
(Revised May 3, 1917)

APPLICATION FOR EXAMINATION FOR APPOINTMENT IN THE MEDICAL RESERVE CORPS, U. S. ARMY.

..........**Inclosures.**

AMERICAN
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RENAL AND URETERAL CONDITIONS IN WOMEN.*

H. DAWSON FURNISS, M.D.
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NEW YORK CITY.

While renal and ureteral conditions in men and women are greatly similar there are some differences. Men are more prone to certain renal and ureteral conditions and women to others. It would too greatly prolong this paper to attempt to consider this subject in a detailed or exhaustive way, so its scope will be confined to a few remarks on conditions that seem to be unusual in men or to predominate in woman.

Floating or movable kidney is the most frequent renal trouble found in women and is found much more often than in the male. It is responsible for many troubles directly and indirectly and it is for the benefit of the complications of floating kidney that surgical procedures are usually instituted. There seems to be some evidence that mobility alone can cause congestion and possibly nephritis.

Chronic appendicitis is a frequent accompaniment of the condition and according to the late Dr. Edebohls is usually a result. The digestive disturbances so often encountered may be due to the appendix or, more likely, to the mechanical distortion of the pylorus or duodenum, rather than a reflex phenomenon.

Dietl's crises are not encountered in the case where there is free mobility of the ureter and the kidney, but in those where the upper end of the ureter is fixed and the prolapse causes acute angulation. From the angulation of the ureter drainage is interfered with and as a consequence more or less pelvic dilatation occurs. Infection in such a dilated and badly drained pelvis often persists a long time.

In regard to the operative treatment, the finding of a floating kidney is not in itself an indication for operation, but I do believe that Dietl's crisis, evidences of gastro-intestinal disturbances and of pyelitis, especially with evidences of pelvic dilatation, call for operation. In properly selected cases the results are good; it is, however, to be remembered that floating kidney is often only a part of the general enteroptosis seen in neurasthenics, and in them the prognosis must be guarded.

Stricture of the ureter, both the upper and the lower portion, occurs with far greater frequency in women than in men. I say this because the regular genito-urinary men write so little of it and because the gynecologist sees many such cases. Hunner reports fifty cases all in women. Most of his cases were of the upper portion.

Of the strictures of the upper end, I believe that infection and renal mobility are the chief causes (I am excluding the stricture of the ureter that is a part of renal-ureteral tuberculosis). Stone is given as a frequent cause, but it has played a minor part in the cases Hunner and I have seen.

The condition is serious, for it is progressive, slowly as a rule, but eventually leading to destruction of kidney function. Again there are many cases where the condition is bilateral. I have had two such cases, one of upper and the other of lower ureteral stricture. I believe that stricture of the upper ureter is more amenable to treatment by dilatation than that of the lower end. It is particularly difficult to keep the lower strictures dilated, even when stretched to large caliber (25 F. through the Kelly cystoscope).

In the diagnosis of these strictures their caliber can be determined by passing catheters on which beads of beeswax have been moulded, and the degree of dilatation above the strictures can be best shown by a pyelo-ureterograph; this also points out what is to be the best treatment. In conjunction with this the renal function of the two kidneys must be determined, as it is useless to do any conservative operative work on a functionally useless organ.

Of the upper end strictures I have had some relieved by dilatation, others by replacement of low-lying kidney, one by an operation similar to a Finney pyloroplastic and another by the separation of adhesions or fascial bands around the upper end of the ureter and elevation of the kidney.

For the lower-end strictures I have four times performed a ureterovesical anastomosis. One was an operative failure and after a month I had to remove the kidney on that side. A second was done over two years ago and an investigation of this in April of this year showed only very slight ureteral and pelvic dilatation (uretero-pyelograph), urine free from pus and the indigo-carmine elimination equaled that of the other side. The collection of the urine by catheter and the functional test with indigo-carmine were done twice to insure accuracy. This, while only one case, is evidence against the claim that the kidneys degenerate when the ureter has been anastomosed into the bladder.

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* Read before the New York Society of the American Urological Association, N. Y. Academy of Medicine, April 11, 1917.

The two other cases have been done within the past four months, and it is too early to say just what the result will be; but this can be said now—they have both been freed of the attacks of renal colic of which they complained. I have tried persistently and conscientiously to dilate these lower ureteral strictures, but the results have been disappointing in that they soon contract..

Since we gynecologists have been doing more of the extensive operations for carcinoma of the uterus, it has been necessary to dissect free the ureter, and in about 10% of these the nutrition has been so interfered with that a uretero-vaginal fistula has occurred. A certain percentage of ureteral injuries occur in the removal of adherent tubes and intra-ligamentous ovarian and uterine growths; which same injuries often result in obliteration of renal function or the production of uretero-vaginal, or uretero-abdominal fistula. When such a fistula occurs, it is necessary to determine its location and its character, whether it is a complete or an incomplete (that is, whether all the urine discharges into the vagina, or whether a portion discharges into the vagina and a portion into the bladder), whether or not infection of the kidney on the side of the fistula has occurred, and the amount of functional damage that has been done.

If the location of the injury is so high that a uretero-vesical anastomosis cannot be done, then we have to consider uretero-colonic anastomosis, doing nothing, or nephrectomy. Anastomosis of the ureter into the colon has been so unsatisfactory that it should not be considered. If the fistulous tract is long the possibilities of spontaneous exclusion of the kidney may be expected, and if no untoward symptoms of renal origin occur, and it is found that the urinary leakage is lessening day by day, it is better to await this exclusion than to perform a nephrectomy.

If the urinary leakage persists, is too annoying, and the function of the other kidney is sufficient, and there are no contra-indications, then nephrectomy should be considered. Often the condition for which the first operation was done is a contra-indication to further operation. If there has been a recurrence of a carcinomatous growth, it is very doubtful whether nephrectomy for uretero-vaginal fistula is justified.

If it is found that the fistula is a partial or incomplete one waiting (or possibly the introduction of a ureteral catheter to a point above the injury) is indicated, as these usually heal spontaneously.

If the injury is sufficiently low to permit a uretero-vesical anastomosis this should be done under proper conditions; that is, if the pelvic and general condition of the patient are good, and if the function of the kidney on the involved side is good or fair, and infection is not severe. Renal infection, if due to bad drainage, is not a contra-indication, but an indication for operation. However, in many of the cases we see months after the injury, the renal involvement is so great and the kidney function so destroyed that uretero-vesical anastomosis is not only folly, but distinctly injurious, in draining a functionally useless infected kidney into the bladder, thereby setting up a troublesome cystitis. Therefore, in cases where a uretero-vesical anastomosis is technically possible, it should be done if infection is slight, renal function is fair, and there are no contra-indications. If the function of the kidney is badly impaired, and infection is marked, in the absence of contra-indications, nephrectomy is advisable.

In regard to the choice of the manner of performing the operation for anastomosis of the ureter into the bladder: There are only very few cases where the injury is so low that the ureter can be put into the bladder by a vaginal plastic. The end of the fistulous tract can be easily turned into the bladder through the vagina, but this leaves a strictured tract through which the ureter has to drain into the bladder, and it is only a matter of time before a nephrectomy will have to be done to cure the cystitis that is kept up by the passage of infected urine through the bladder—also, the function of the kidney is soon destroyed. The best operation, I believe, is the extra-peritoneal uretero-vesical anastomosis. Many claim that soon the function of the kidney where such an operation has been done is destroyed, but the case here referred to under stricture of the ureter refutes this.

Soon I hope to publish the technic of uretero-vesical anastomosis that I have found very satisfactory, and in the same communication to compare the conditions as regards symptoms, infection, and renal function before and after operations.

Have you interested the young physicians in your community, fresh from the hospital, in the imminent need of medical officers for the army and the navy?

ACQUIRED SYPHILIS OF THE PANCREAS.

J. Thompson Schell, M.D.
Philadelphia.

My attention was drawn to this condition by the interesting case here reported. I searched the literature of this subject carefully but could not find much to enlighten me. There seems to be a belief that syphilis of the pancreas is usually congenital. Some writers admit that this condition can be caused by the acquired type of the disease but that its presence is discovered post-mortem or when the abdomen is opened for some other condition, as there are no characteristic symptoms. I did not recognize the true pathology of my case even after examining and handling the pancreas at the time of operation.

Rokitansky describes the presence of callosities in other organs than the liver, in individuals affected with constitutional syphilis, and among them in rare cases, he mentions syphilis of the pancreas; so also do Lancereaux and Chvostek. Gummata are, however, also found in this organ. They say further that syphilitic disease of the pancreas may be in all probability be difficult to discover during life. Fatty diarrhea, glycosuria, and epigastric pain occurring in an individual suffering with syphilis are of some value in the diagnosis.

D'Arcy Power and A. Keogh Murphy say: "Out of 188 cases of disease of the pancreas, syphilitic changes were found in three. Pancreatic lesions are more frequent in hereditary than in the acquired disease, the organ being affected in 20 per cent. of syphilitic newborn. In adults chronic interstitial pancreatitis is the more frequent form but both gummatous and cicatrix formation have been met with."

Symptom:—The common type is associated with dyspepsia, wasting and fatty stools, the diagnosis being made from evidence of syphilitic disease of other organs. If the head of the pancreas be affected by a gumma it may give rise to jaundice. Tenderness in the region of the pancreas is an occasional symptom.

Da Costa says "Syphilis is a cause of pancreatitis no more."

Johnson's Surgical Diagnosis:—"Syphilis and tuberculosis cause nodular or diffuse swelling of the pancreas but none of these conditions possess any great surgical interest."

Cechoce: "Syphilis of this organ may be marked by a chronic interstitial inflammation leading to enlargement and also gumma; it is always congenital."

Lancereaux has found the pancreas indurated at autopsy and gummatous tumors of the same organ have been observed. No special symptoms mark the affection during life.

White & Martin—"Specific disease of this organ may take the forms of interstitial pancreatitis or a gummatous involvement. These lesions are extremely rare. Their presence is not indicated by characteristic symptoms during life. There is usually marked involvement of other abdominal organs."

These few quotations are fair examples of the literature on this subject and while no doubt syphilis of the pancreas is a rare condition, it is probably not quite so infrequently present as it might seem, if we were more alert in seeking for it.

I have spoken to many internists and abdominal surgeons and have found none who have seen or at least recognized this condition during life and I therefore feel justified in reporting the following case:—

Miss C. W., a trained nurse, first consulted me for pain in the upper part of abdomen. This pain and tenderness seemed to be located in the region of the pylorus or head of the pancreas. She complained of much nausea and some vomiting, loss of weight and pain throughout the abdomen, especially when the bowels are moved. The stomach contents analysis showed a slight increase of total acidity and the free hydrochloric acid was slightly increased. There was occult blood present in the gastric contents but not in the stools. Her appetite was good and the burning sensation and pain were relieved by taking food or liquids. There were also some pelvic symptoms, backache, leucorrhea, dysmenorrhea, and at this time irregular menstruation. On account of the pain and nausea the patient was not able to follow her usual occupation. An exploratory operation was finally decided upon after an unsuccessful medical treatment had been tried for a period of about three months. A low median incision was made, the uterus, tubes, and ovaries found bound down firmly from some previous pelvic peritonitis. The appendix, which was also bound down and retrocecal, was removed. The upper quadrant of the abdomen was explored and no evidence of ulcer found but the head of the pancreas was quite hard and somewhat enlarged. There were a few adhesions in the region of the pylorus which were broken up and sterile paraffine oil applied liberally. The patient made an uninterrupted recovery and seemed slightly better for a few months but gradually the pain and tenderness in the upper abdomen returned and at times a slight jaundice was noted.

Believing that a cholangitis or some other pathogical condition in the neighborhood of the common duct had been overlooked at the first operation, another section was performed and this time the incision was made in the right upper quadrant to expose the gall-bladder, ducts, and pancreas which were carefully explored. The gall-bladder, which was somewhat enlarged, emptied very slowly under pressure. The pancreas was larger than at the first operation and still very hard. A diagnosis of chronic interstitial pancreatitis with cholangitis was made and the gall-bladder was opened and drained, with considerable improvement in the patient's condition. Six months later, however, the symptoms were again as marked as before the first operation.

At this time I discovered, quite by accident, the following interesting history: After attending a maternity patient; some eight years before, suspected to be suffering from syphilis, she noticed a small sore on her finger which was slow in healing and later she had a slight skin eruption and some sore throat. The possibility that I was dealing with a case of acquired syphilis of the pancreas was now forced upon me. A Wassermann test which should have been made before was now reported . . . Salvarsan was given followed by the usual mixed treatment with a marked improvement in general health and a rapid disappearance of all of gastric symptoms. She had become apparently a well woman and can eat and digest all kinds of food with no ill-effect or gastric symptoms. She has gained twenty-one pounds in weight and while she is still under treatment she claims that she is entirely well. The last three Wassermann reactions have been negative.

The importance of routine Wassermann examination is emphasized by this case; had this been done in the beginning the patient would have been spared the ordeal of two operations.

This report is submitted to the profession with a full admission of the error in diagnosis and with the hope that it will help to prevent similar errors in the experience of others.

Since this experience I have had several obscure gastro-intestinal cases that have shown positive Wassermann reactions who have improved markedly under specific treatment, but I have not had an opportunity to open the abdomen and examine the pancreas.

References.

D'arcy Power & A. Keogh Murphy, Page 36, Vol. 3.
DaCosta: Syphilis of Pancreas, Page 1060.
Cechoce, Page 799.
White and Martin, Page 439.

Roentgenography in Vesical Calculi.

At present there are two methods which have been suggested to render invisible stones opaque to the rays. One is the coating of the calculus with a silver salt, either argyrol or collargol, the other is the roentgenogram of the air-inflated bladder. The former has been unsuccessful in the few cases of bladder stone in which we have used it. The air inflation procedure was only used in a few instances, and in one case gave a suggestion of a shadow where stone was previously present. When cystoscopy cannot be performed it may prove advisable to attempt one or both of these methods. —A. H. Hyman, in the *Interstate Medical Journal.*

THE SURGICAL TREATMENT OF POLIOMYELITIS. *

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When we speak of the surgical treatment of infantile paralysis, we mean that the inflammatory element has subsided and we are dealing with the remaining lesions. In poliomyelitis there is destruction of certain cells in the spinal cord, while other cells are impaired through the effects of edema; therefore, it may take some time to determine the extent of the damage. How much is due to cell destruction (which of course is always permanent), and how much to impairment through edema and hemorrhage? We may have to study the case weeks or even months before we can draw entirely accurate conclusions.

The surgical treatment of infantile paralysis falls under two general headings: (1) prophylactic, and (2) reparative. Under prophylaxis a great deal may be done toward preventing extension of the damage by keeping the limb in proper position. When you consider that the disease is almost altogether one of early childhood, before the bony system has fully developed, you can readily understand how important it is, even after paralysis has occurred, to maintain the limb in proper position so that the bones will develop normally. In this way much of the resulting deformity may be prevented.

It has been shown by Jones, of Liverpool, that if a muscle is overstretched, it is practically the same as if paralyzed so long as it is allowed to remain in the overstretched state. For instance, if a foot is thrown into abduction because of paralysis of the tibial group of muscles, the foot is pulled upon by the powerful peroneus muscles of the opposite group which will be overstretched. While the muscles may not be paralyzed, the effect is practically the same so long as they remain in this overstretched state. The foot must be brought into an overcorrected position and maintained there for some length of time before you can really determine whether the muscles are paralyzed or merely overstretched. It is extremely important, of course, to determine whether you have paralysis or functional impairment from overstretching.

While waiting to determine the exact condition present, you should have the limb in proper position, you should also practice massage, use electricity, and increase the vigor of the affected tissues as much as possible. These mechanical methods of treatment are not so simple as might at first appear, and oftentimes the patient is overtreated because the attendant does not understand the indications, contraindications and limitations of such measures. Massage should be correctly applied, and the weakest electrical current should be used which will produce muscular contraction. Both these measures should be used with caution, and not too long at any one time. We should not rely solely upon either galvanism, nor upon faradism, but both should be used as indicated. In this manner we are able to get the maximum benefit.

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* An address delivered before the Louisville Medical Club, of Louisville, Kentucky, December 1st, 1916.

Assuming that the affected limb has been maintained in the proper position, one can determine by the electrical test, or by the method of Spitze, the extent of muscular impairment or paralysis present. The Spitze method consists in taking a needle and approaching the little patient see if he will draw the limb away from you. This is a splendid way to test the muscular action. Both tests may be used to advantage in determining the extent of impaired function, and this is absolutely necessary before treatment can be intelligently applied. If the limb has been allowed to assume a faulty position by gravity on the one hand, or is drawn toward the unparalyzed side by the strong muscular action on the other, you must study the condition carefully to determine what is paralyzed and what is merely overstretched.

In the reparative treatment we have first nerve implantation or anastomosis; second, transplantation of tendons; third, arthrodesis. Which of these methods, or combinations of them, shall be used will of course depend upon the condition present. If only one or two of the muscles are paralyzed, in other words if extensive destruction has not occurred, you can sometimes correct the deformity by tendon transplantation. This may be done early, that is while the child is between three and five years of age. If, however, extensive paralysis has occurred, and instead of the foot being merely drawn slightly to one side, which may be corrected by proper distribution of muscular power, tendon transplantation may not suffice. If as a result of the extensive destruction you have a flail joint, this cannot be corrected by change in muscular distribution alone; and here is where many mistakes have been made and bad results have followed orthopedic work, i. e., operators have tried to accomplish results they had no right to expect. For instance, no one has a right to expect transplanted tendons to hold a flail joint in position and enable the patient to walk. It cannot be done. You may be able to get the foot in proper position, but it will not be held there with that degree of firmness necessary to withstand the shock incident to walking. In such cases you must supplement tendon transplantation with arthrodesis, and if you are going to make a stiff joint then you must wait until the child has arrived at the age of eight or ten years or even older; and here again mistakes have been made, i. e., arthrodesis has been produced in children three to six years of age. The operation at that age will be a failure, for the reason that bony development is insufficient to insure union. If there is a flail joint and arthrodesis has to be produced, then you must wait until the child is ten to twelve years old. In the meantime of course work can be done on the limb by muscle training, electricity, massage, etc., and the limb maintained in proper position. The treatment of deformities resulting from poliomyelitis will be a long story in the majority of cases.

In regard to tendon transplantation: Dr. Gallie, of Toronto, has devised an ingenious operation by which he used some of the paralyzed tendons as ligaments. In some of his cases operated upon three or four years ago function has remained satisfactory. A groove is chiseled in the bone and the tendon is fastened there, thus acting as a ligament. Of course in these cases the surgeon has to study the condition carefully, and then make the most of tissues he finds can be used. For that reason Gallie's idea is a splendid one, and it may be successfully applied in many cases. By this method it is possible to make ligaments out of the useless paralyzed tendons.

In transplanting tendons we can do one of three things: We can split the tendon and allow one-half to remain where it is, say it is a flexor, and transplant the other half and make it act as an adductor, or as some operators have done and are still doing, make it act as an extensor. It is the opinion of most surgeons, however, that we have no right to attempt the latter procedure, and I think common sense will make it plain, that it is unfair to take a flexor tendon, split it in half, and switch one portion over and try to make it act as an extensor. This is expecting entirely too much, as you cannot make a tendon act when it is divided against itself; consequently, while it may be possible to split a flexor tendon and make an adductor out of half of it, you cannot expect to make an extensor in this way, as you cannot make the two ends pull in opposite directions. Therefore, if you are going to make an extensor, you must take the whole tendon and not half of it. Of course you can make half the flexor tendon assist in supination or pronation as the case may be.

The second plan is to divide the paralyzed tendon and attach it to the proximal end or the side of the unparalyzed tendon. For instance, you can take the lower end of a paralyzed tendon and switch it over to the unparalyzed tendon which you wish to use without dividing the latter. Or the proposition may be reversed, you can divide the unparalyzed tendon and attach it to the one which is paralyzed.

When you transplant tendons you can attach the transplanted tendon either to the other tendon, or to the periosteum of the bone. The tendency now is to attach the transplanted tendon to the bone or the periosteum as near as possible to the point of attachment of the paralyzed tendon which you are going to replace. For instance, suppose you have abduction due to paralysis of the tibialis, you have on the opposite side the strong peroneus longus, brevis and tertius. The peroneus longus is worth more than the brevis and tertius combined. If you bring the strong peroneus longus over and attach it to the paralyzed tibialis anticus, the deformity will be almost perfectly reduced.

In transplanting the tendon you should make it almost on a straight line, or but slightly oblique; do not try to make it "go around the corner" to do its work. You must arrange the tendon in such way as to avoid a right angle, as it will not work properly in that way. Also if you possibly can, make the transplanted tendon slip into the sheath of the paralyzed tendon. There are two reasons why this is advisable. First, you have a lubricated sheath for the tendon, thus avoiding adhesions and fixation and the tendon can work smoothly; second, you obviate a right angle.

Where you have shortening of any of the tendons, they can be easily made longer. Do not resort to tenotomy but lengthen the tendon by dividing it half across at two different points some distance apart, then by splitting the tendon you can secure whatever length may be desired.

If you transplant the tendon and get the foot in proper position, unless there is a flail joint as already indicated, you do not have to produce arthrodesis, and cuneiform osteotomy will also be unnecessary. However, in neglected cases you may have to do a cuneiform osteotomy in order to get the foot into proper position.

Before transplanting the tendon the foot should be manipulated under anesthesia so as to get the tissues well stretched; do not rely upon the transplanted tendon to pull the foot around into position. You must get the foot in proper position first, and the transplanted tendon will hold it there. Of course if there is not much paralysis, arthrodesis will be unnecessary, but if there is a great deal of paralysis you must produce arthrodesis in addition.

A plaster dressing is applied and left intact for six to eight weeks. The dressing is then removed, and you commence to manipulate the limb or foot as the case may be, using electricity, massage, etc., to develop the limb as much as possible. It is surprising how these paralyzed limbs will sometimes develop under proper treatment.

One of the most important points which I would like to emphasize is that usually the surgeon does not see these patients with deformed limbs following poliomyelitis early enough. They are brought to us several years after recovery from the original attack, and we are then expected to accomplish what may be impossible. We may have to work several months to overcome deformity which might have been prevented by proper early treatment and care.

A NEW INSTRUMENT FOR THE APPLICATION OF THE SEWING MACHINE STITCH IN GASTRIC AND INTESTINAL SURGERY.*

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The proper choice and application of suture technic for the purpose of anastomosis and for the closure of incisions into stomach or bowels are among the essentials for successful gastric and intestinal surgery. We must have a method which prevents leakage of the visceral contents, consumes the shortest amount of time and assures absolute hemostasis. Of these requirements the last is of the greatest moment. Speed of application is always desirable, but it must not go beyond a point of safety and may not be a vital question, except on rare occasions. Prevention of leakage after the first few hours, is aided effectively by plastic adhesions of the serosa. Hemostatis, on the other hand, must be immediate and as near the absolute as possible, or the patient's life is jeopardized by inefficient technic from the very time of operation. My own experience and conversations with other surgeons have convinced me that none of our older suture methods are invariably satisfactory with respect to the problems mentioned above. It may be a confession of weakness in the art of suturing to admit that we have seen hemorrhage follow what was considered a perfect application of a Connell continuous suture; yet the confession must be made out of true interest in our art.

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* Read before the Western Surgical Association, St. Paul, Minn., December 15, 1916.

In order that a suture be absolutely hemostatic it is necessary that it comprise, and compress, every part of the incised tissues. A discussion of the various suture methods possible for the accomplishment of this aim is not the object of this paper. Its purpose is to call attention to the use of the double, interlocking, through and through running suture, best illustrated by the stitch made by the ordinary sewing machine in sewing two edges of cloth together. The sewing machine needle differs from other sewing needles in having its eye near the point. When the needle is pushed through the cloth the point carries a loop of thread immediately to the opposite surface of the material. The shuttle passes through the loop, the needle is withdrawn, and the upper and lower threads are interlocked within the opening made by the needle. A succession of stitches makes a firm compression on all fibers of the material between the stitches. It is evident that wherever this type of suture can be applied tightly to any living and bleeding tissue there will be a uniform compression of all structures of this tissue, and hemorrhage distal to the suture line cannot take place.

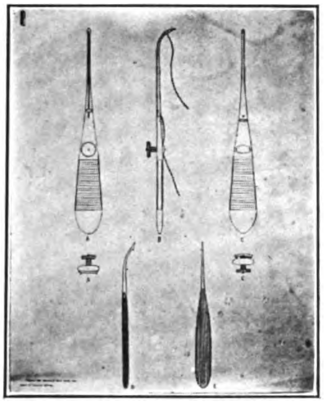

Fig. 1. Needle and "shuttle" with cross-sections of tension spring.

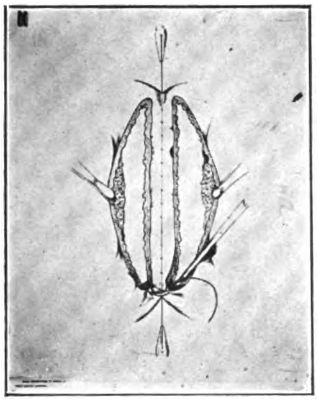

Fig. 2. First introduction of needle at angle nearest operator.

In order to make a practical application of this principle in gastric and intestinal surgery, I found it necessary to devise a needle after the type of the one on the sewing machine. Numerous models have been made (by V. Mueller & Co., Chicago), but it is believed that the one now demonstrated will be found most satisfactory for the work mentioned (Fig. I). The needle is round and slightly curved toward the point. An eye large enough to carry No. 2 chromic catgut is placed about one-fourth of an inch from the point. The convex border of the needle is grooved from the eye to the handle so that when the needle is threaded the catgut lies within the shaft between these two points. The base of the point near the eye has a slightly greater diameter than the shaft immediately above the eye, in order to make the opening through the tissues large enough to accommodate the passage of the catgut, resting on the concave side, without tearing. The upper end of the shaft ends in a flattened handle, making the entire instrument about five inches long. A tension spring is placed on the handle, so as to hold the catgut taut and to allow its ready release as the stitching progresses.

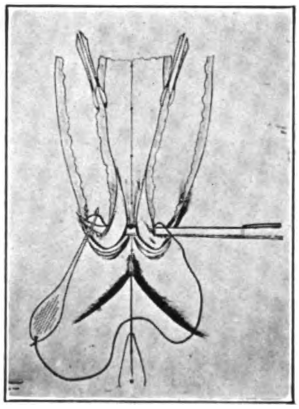

Fig. 3. The same stitch with crochet-hook "shuttle" needle ready to pass through catgut loop near eye of other needle.

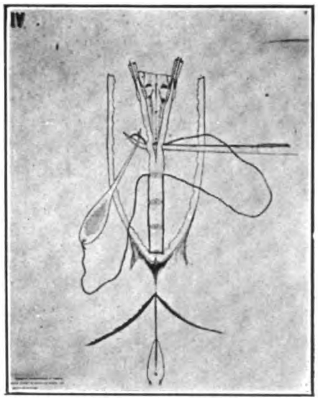

Fig. 4. Schematic demonstration of "sewing machine stitch" in posterior suture line of gastro-enterostomy.

The other end of the catgut is fastened to another needle which takes the place of the "shuttle" in the sewing machine. A Hagedorn, or an ordinary darning needle, may be used for this purpose. It was found, however, that a small hook near the point is a great convenience for picking up the catgut loop from the concavity of the other needle, and a special crochet-hook "shuttle" needle was therefore made for this purpose.

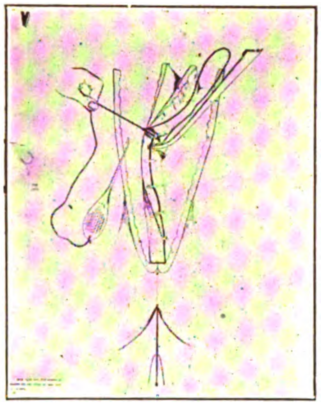

Fig. 5. After tying knot over margins of mucosae the next stitch is begun back of the knot.

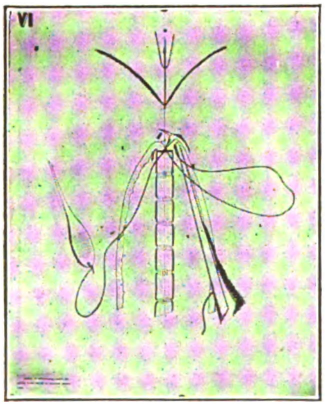

Fig. 6. Method of introducing needle for making first stitch in anterior suture line.

The technic for a gastro-enterostomy as now practiced by me may be described as follows: The stomach and jejunum are first approximated by the usual serosa-to-serosa suture, the incisions are made and spurting vessels are clamped temporarily. The hemostatic suture is then begun with the special needle, threaded with a twenty-four inch long No. 2 chromic catgut stitch, at the side nearest the operator. The point is introduced from inside the bowel, and in line with the long axis of the incision so as to emerge on the serosa about one-fourth of an inch from the angle (Fig. II). The needle is then made to penetrate the stomach wall at the corresponding point from its incision. It is pushed just far enough into the stomach to allow the "shuttle," fastened to the other end of the catgut, to pass through the loop picked up with the hook near the eye of the needle (Fig. III). By withdrawing the needle and making an even pull on the two ends of catgut, the first stitch is pulled tight. Care should be exercised that this stitch is located near the middle of the catgut and the length of catgut between stitch and needle should be kept about three inches.

This process is repeated, making a series of stitches of suitable length (about 3/16 of an inch) until the middle of the posterior suture line is reached (Fig. IV). Here the catgut is pulled up tight and tied over the mucous membrane margins in order to prevent slipping and loosening up of the even pressure. After tying this knot it is necessary to resume the stitching at least as far back on the suture line as where we left off the last stitch before tying the knot (Fig. V). Unless this is done there will be a section of unsutured tissue immediately under the knot. This point should be kept in mind every time the catgut is tied over the edges of the mucosae.

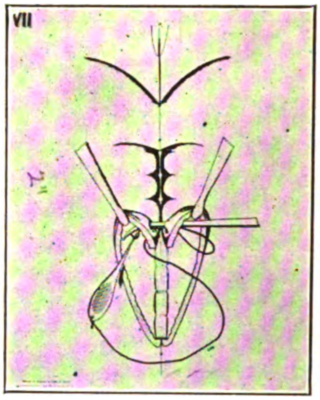

Fig. 7. Method of picking up loop of catgut in anterior suture line (note inversion of mucous membrane margins).

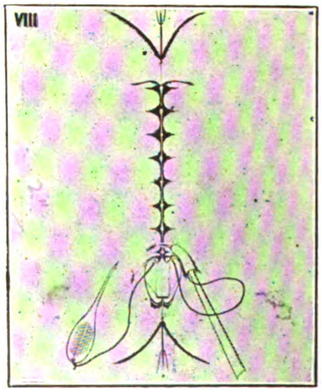

Fig. 8. Introduction of the first of the two stitches closing the final gap (note that entries and exits of needle are on the serosa).

When the farther angles of the incisions have been reached, the ligatures are again tied. From now on a slightly different technic becomes necessary. The point of the needle is passed from inside the jejunum up through its serosa, then brought across to the gastric margin which is penetrated from serosa to mucosa (Fig. VI). The catgut loop is picked up with the "shuttle" on the gastric mucosa and a perfect serosa-to-serosa approximation can be seen to take place (Fig. VII). The stitching is continued in this fashion, with one or two knots for fixation, until the wound is so nearly closed that it becomes difficult to pass the needle from within the lumen of the viscus. The catgut is then pulled taut and tied. The remaining gap, a half an inch or less, can be closed with the same continuous suture by two through and through stitches as follows:

The needle point enters through the serosa of the jejunum near the center of the gap and is passed back within the lumen to a point near the knot of the last stitch. Here the point comes out of the bowel and is made to enter and leave the stomach at the corresponding points in exactly the reverse order (Fig. VIII). This stitch is not pulled taut, but grasped and held loosely by forceps on each side. The needle is again pushed into the jejunum near the point where it entered for the previous stitch and made to come out through the serosa near the end of the incision. It enters and leaves the stomach in reverse position and the last stitch has been placed (Fig. IX). The first of these two stitches is now pulled taut with the forceps already in place, and the ends are pulled up and tied. The inversion of the mucous membrane takes place more smoothly if this last stitch be inserted in the opposite direction, that is, from stomach to bowel, but as this must be done from left to right it is a little awkward and takes more time.

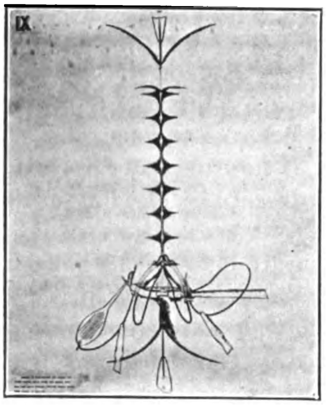

Fig. 9. Method of introducing the second and final stitch after which the catgut ends are tied (note forceps holding catgut until last stich is placed).

The last two stitches with the special needle may be supplanted by a through and through figure-of-eight suture with an ordinary intestinal needle (Fig. X). This is advisable in any case when the gastric wall is unusually thick, or when there is an active bleeding at this unsutured part of the gastric and intestinal incisions.

The closure of a simple incision, as for instance into the stomach for exploring purposes, or after the excision of an ulcer, is done in the same manner as the anterior suture line in gastro-enterostomy. In intestinal anastomosis the same plan of procedure is followed as in the gastro-enterostomy described, and needs no further comment.

If this technic has been properly followed out there will be a uniform inversion of all mucous membrane margins, the cut tissues are all ligated, and the suture is visible at no place except, perhaps, the final knot which is covered over by the customary musculo-serosa suture. Since the operator has both hands occupied with the two needles, it is important to have an assistant who understands the technic perfectly if the suturing is to be done accurately and rapidly. The assistant catches each of the two edges about to be sutured with a tissue forceps, and holds them in proper position and tension for each stitch.

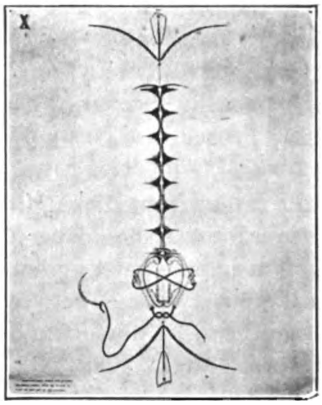

Fig. 10. Figure-of-eight suture with ordinary intestinal needle, which may be used to close the last part of the incision.

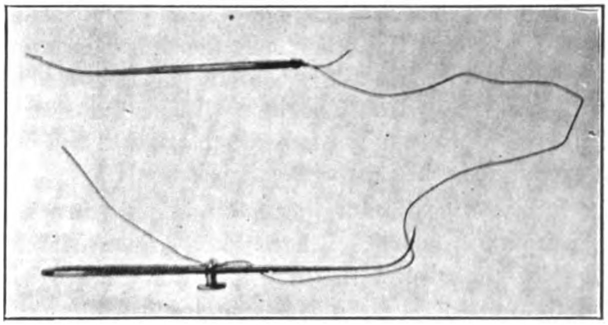

Fig. 11. Photograph showing needle properly (but loosely) threaded.

Attention should be called to a few minor "troubles" which may arise during the application of the suture. The most serious difficulty is the possibility of the catgut becoming stuck in the groove or eye of the needle. This happens when the catgut is uneven, water soaked, or too large for the needle. In order to avoid making the needle holes through the tissues large enough to invite danger of leakage or hemorrhage, the needle shaft has been made so small that its diameter approaches that of the common intestinal needles. This reduces the eye to such a small size that only No. 1 or No. 2 of the ordinary commercial catgut can be used successfully. I have employed the No. 2 Flanders chromic catgut in nearly all gastric and intestinal work referred to below. However, the size of catgut does not constantly conform to the number on the label, and therefore it may be stated that a chromic catgut just fine enough to run easily through the eye when the tension spring is released, will be found of sufficient caliber in the greatest number of cases.

To prevent the catgut from sticking fast in the eye the following precautions should be observed: Do not soak the catgut in any watery solution, to cause it to swell. If there is a close fit between catgut and eye, put a drop or two of albolin into the groove. If nevertheless the catgut does not "run" as it should, the point of the "shuttle" may be introduced through the little transverse groove at the base of the shaft to lift the catgut out of the groove. This will simplify the manipulation of a swollen catgut through the eye.

Any tendency to snarling on the part of the catgut is easily prevented by always pulling one end taut (preferably the "shuttle") before tightening the other end.

In case either end of the suture material should accidentally break during the stitching, it is not necessary to rethread the instrument with a fresh ligature. The broken end may be tied rapidly in a firm loop around the other, and the unbroken end attached to the "shuttle" or to the special needle as the case may be. The loop will be pulled up tight and the continuity of the double suture will be re-established when the next stitch is made.

After a series of experiments on animals, for the perfection of technic, I have now (since March 14, 1916, the date of the first operation) employed this suture method in 20 gastric and intestinal operations as follows:

11 posterior gastro-enterostomies for duodenal and pyloric ulcers.
2 excisions of gastric ulcer of the lesser curvature.
1 excision of a posterior perforated gastric ulcer through an incision in the anterior gastric wall—the latter incision being also closed by the same method.
1 anterior gastro-enterostomy for perforated duodenal ulcer.
1 anterior and 1 posterior palliative gastro-enterostomy for inoperable pyloric carcinoma.
2 end-to-side entero-colostomies after resection of the cecum.
1 side-to-side entero-enterostomy after bowel resection.

The results have been very satisfactory. That leakage is effectively prevented by the double, interlocking suture requires no argument. The time previously consumed for making a gastro-enterostomy has been reduced by nearly one-half. To prove the hemostatic efficacy of the method in gastro-enterostomy, a gastric lavage was performed on the patients with duodenal ulcer immediately after the operation, and repeated about two hours later. With the exception of a few shreds of clots in two or three instances such as might easily have escaped during the operation, performed without clamps, there was no macroscopic evidence of oozing. Occasional emesis after the operation gave the same negative evidence. Previous observations with other methods of suturing had rarely, if ever, shown such complete absence of bleeding in the post-operative vomitus.

Since this suture cuts off all blood supply from the margin of the anastomosis, it is possible that a very early sloughing and digesting away of the devitalized part may take place. It has been questioned for this reason whether this suture may not be too hemostatic for safe application to the stomach. The experiments made on dogs did not indicate that such necrosis has caused any damage. The healing of the mucosae after two or three weeks was almost perfect. This is in line with the findings of Draper and McCarthy (*Surg. Gyn. & Obst.*, 1912, XIV. 558), who made a number of experiments on dogs to determine the fate of the devitalized tissue in the pentagonal suture for gastric ulcer. They found that although this tissue was rapidly expelled, mucous membrane healing took place promptly. There was no evidence of failure in healing from too early necrosis. They used non-absorbable suture material. It is my belief that the catgut is digested away after any operation on the gastric mucosa long before the tissue in question has time to disintegrate. While it is admitted that this question is open for further study, a firm outer suture of the muscularis will obviate any possible danger from this source.

It is evident that the sewing machine stitch may have other fields of usefulness in surgery, chiefly for its hemostatic effect. It has been applied with satisfaction to pedicles of omentum and broad ligament; also in hemorrhoidectomy and thyroidectomy. For the closure of skin incisions a special needle with a cutting edge was devised; but the method does not lend itself in all respects satisfactorily to skin closure and its use for this purpose cannot be advised.

An effort was made to learn whether this simple suture method had not previously been described in surgical literature. It was found that the principle has been mentioned a few times, not so much for hemostasis as for approximation of superficial structures. The earliest reference found was that of Michailoff (*Khirurgia*, Moscow, 1897, 1-285), who recommended its use in plastic operations on the cervix and perineum as well as for the closure of various skin incisions. He applied the suture by means of a modified Reverdin's needle.

In concluding, it may be said that after a careful consideration of the various factors involved in the employment of this suture and of the practical results obtained from its use, I feel justified in recommending it as a method certain to prevent leakage, rapid of execution and efficient in hemostasis.

The Use of Some Simple Things in Surgery.

1. *"Cements" for the removal of foreign bodies* from urethra—chiefly stone. Pass a full-sized endoscopic tube with round, not oblique, end, down to body and fix the latter by finger behind it from the outside. Remove moisture by cotton-wool. Melt some "elastic glue" and dip the pen end of a penhandle therein; quickly pass this down the tube and retain in contact with the body for some time. Withdraw tube and pen-handle together. In the only case I tried this it was successful. Cold externally would make the "cement" set better, and perhaps other things (pitch, etc.) might stick firmer still. Forceps nearly always tear the mucous membrane. The same device might be used for the ear.

2. *A condom* tied over a catheter, lubricated, passed and inflated, is useful for urethral or prostatic hemorrhage. Perhaps likewise for epistaxis.

3. *A wine or whiskey bottle* containing hot water, and *kept pressed* to the perineum for some hours, the night of the day an instrument is passed, very materially aids the absorption of stricture, and is much more striking than fibrolysin; containing cold water it is the best means of subduing the erethism of inflammation. It is efficient in pruritis ani.

4. *An elastic bandage* applied at proper time after a hydrocele is injected (iodine and carbolic acid), by keeping the layers of tunica vaginalis in apposition, will often lead to radical cure.

5. Tinct. iodi painted on the hands, over this tinct. benzoin, co., and over this iodine again, is no mean substitute for gloves.

6. *Extemporary specula, etc.* The handles of two toothbrushes are an excellent anal speculum; the loop ends of hairpins bent at right angles, good nasal. Two teaspoons bent back 1½ in. from bowls make a bladder speculum. Dinner forks bent forward at prongs are the best wound retractors.

7. *The end of a scalpel handle* flattened more, rounded off, and serrated forms a much needed dissector (separating bladder, etc., from adhesions).

8. *Any thick-walled small rubber tube* cut very obliquely at one end, the edge of the ellipse being smoothed off by a heated knife blade, constitutes, when well lubricated, a capital catheter.

9. *A whalebone stylet* bent into coudée shape in hot water and passed into this or into any rubber catheter, makes the best coudée catheter.

10. *Bristle and wire pipe cleaners*, pulled to and fro through catheters, are the best cleaners of their lumens.

11. *A tuning-fork* is useful in the diagnosis of fracture.

12. *The air balloon of a small football* under a T bandage and inflated by a cycle pump makes the most efficient perineal pressure, and above the pubis the best uterine. A child's stout air balloon makes a Petersen's bag.

13. *A strip of lint* tied round the root of the penis and embracing the scrotum behind the testes is the handiest contrivance to which to attach the threads of a retained catheter.

14. *The hair of women* in scalp wounds, after disinfection of the parts by iodine, can be used as sutures by tying bundles of the hairs together. As far back as my student days I used this (and with no more sepsis than with ordinary modes) in Dublin, a city then distinguished for its lacerated scalps.

15. A stout stick under the bent knees, the ends connected to the top of the operating table by two bandages, does for a Clover's crutch.—James MacMunn in *The British Medical Journal.*

Have you asked yourself whether YOU ought to join the Army or Navy Medical Reserve Corps?

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, OCTOBER, 1917.

TRAINED MILITARY SURGEONS.

The sudden expansion of gases, liquids, or solids is accompanied by vigorous destructive forces. The rapid transformation of the Medical Department of the United States Army to meet the exigencies arising from the multiplication and intensification of medico-military work has been accompanied by many symptoms of disorganization.

In spite of numerous and tremendous obstacles, the regulating powers have slowly gained control until now the muzzle velocity of the bolt of mercy is approaching its maximum and there is every assurance that the distant goal of efficient service will be attained.

Complaints against the granting of commissions to inefficient and untrained medical men and the assignment of inexperienced and apparently incompetent medical officers to types of work for which they have been entirely unfitted have been numerous. While this fact may temporarily cause considerable dissatisfaction and inconvenience, it must not be forgotten that the immediate demands upon the medical forces so rapidly mobilized were of such a nature that it would have been an imposibility to supply a satisfactorily trained corps of military surgeons.

The entire army, including all officers, is undergoing a course of vigorous intensive training. The medical officers are under the obligation of assuming responsibilities and of fitting themselves for the efficient performance of their duties under trying and unfortunate circumstances. A situation has arisen which can not be viewed without regret although the unusual imperative circumstances must serve as the basis of acceptance of present standards with a sympathetic understanding of the importance of an immediate provision of medical service for the enlisted army.

The surgeon from civil life inducted into a military environment has much to learn. The conditions of medical and surgical practice in the army varies greatly from the practices in hospitals, dispensaries, and homes. Laying aside all questions of administrative and executive work the stress which is placed upon sanitary and hygienic matters transcends any experience of the average surgeon. While surgery itself, with its complicated technic, has reached a high plane during years of peace the problems of caring for the wounded during times of battle involve problems practically unknown to non-military surgeons. The recent surgical history of England and France indicates that civilian surgeons can not perform the services of military surgeons until they have undergone radical re-education in camps, base hospitals, and field dressing stations.

Military surgery as described by Penhallow points out that the condition of wounded men depends more upon the size of the wounds, the regions involved, and the degree of exposure to which they have been subjected before the administration of adequate surgical care than upon fatigue, malnutrition or underlying constitutional disease. The treatment of men twenty-four to thirty-six hours after they have been wounded, with their mud-soaked clothes, their first aid bandages, stiffened from dry blood, clinging to their wounds, exhausted by hemorrhage and weakened by shock does not represent the ordinary type of surgical patients that is received in modern hospitals. Trench foot, gassing, shell and shrapnel wounds, bayonet and knife lacerations, contusions from clubs or rifle butts and violent infections create injuries that test surgical judgment, ingenuity and skill to the utmost.

Most of the fighting in this war has occurred over highly cultivated lands which have been extensively fertilized for past years. The presence of b. tetani, bacillus aerogenes capsulatus, and streptococcus fecalis in the soil make infection almost certain and introduce the element of sepsis into the largest proportion of wounds of all types. The variety of joint and bone injuries, the severity of lacerations and destruction of nerves and blood vessels present problems far beyond the experience of surgeons in civil or industrial life.

From the standpoint of military effectiveness probably every Medical Reserve Officer must be regarded as a student. The larger number of surgeons who have been specialists in disease of the eye, ear, nose, and throat, the internist whose surgical ability has been latent rather than expressed, the obstetricians, the neurologists are destined to undergo a vast amount of reeducation before they will have attained the ability to cope with the difficulties of military surgery.

While criticisms have been widespread concerning the details of administration, insufficient stress has been placed upon the shortcomings of the surgical profession to deal with the essential surgical problems which they are to meet on foreign soil. There is a tremendous responsibility resting upon the Government and the profession to afford every opportunity for the training and practical education of the Medical Reserve Corps along the lines most necessary for safeguarding the lives and limbs of enlisted men. Red tapism has heretofore long characterized army progress and administrative duties have played a large part in the organization and movement of masses of men. This must not interfere with the power and vitality of the Medical Corps to care for the health of soldiers and to restore to the maximum usefulness those who suffer from the diseases and disabilities attendant upon modern warfare.

The time for petty jealousy, for unwarranted criticism, for unjustified recriminations has passed. The Medical Reserve Corps is being rapidly mobilized and the medical fraternity has nobly responded to the call of duty. The need of the day is responsive harmony, willing co-operation, intensive study and earnest application to the real work of the Medical Reserve Corps—the protection of the health and welfare of American soldiers.—T. S. W.

YOUNG PHYSICIANS, *YOUR OPPORTUNITY.*

Never again in the history of medicine in this country will such an opportunity be afforded you to serve your country as well as the best interest of yourself.

The experience which you will gain by being commissioned in the Medical Reserve Corps and seeing active service, will be worth more to you in a professional way than you could acquire in years of practice in civil life.

The pay granted to officers in the Medical Reserve Corps is sufficient not only to cover all needs, but enable you to lay aside a comfortable balance, and while the older men in the profession have come forward, it is to the younger men that the greatest benefits accrue.

The experience will prove broadening both professionally and mentally. With this experience and the thought that you have served your country in time of need, you will return to civil life and receive the further benefits from your patients, friend and acquaintances, always accorded to one who has been so prominently individualized as this opportunity will afford you.—MacD.

LEWIS A. STIMSON.

Lewis Atterbury Stimson, professor of surgery in Cornell University Medical College, died on September 17th at the age of seventy-four. He was, indeed, a notable figure in surgery and in surgical literature. If he had done nothing else than to leave his Treatise on Fractures and Dislocations merely as a model of scientific book writing, he would still deserve to be long remembered, and to be followed by bibliographers yet unborn. In reviews of this work—the eighth edition of which appeared only a few months ago—we have repeatedly referred to it as a classic. It is a classic of bibliographic thoroughness and scientific critique. It should be an inspiration to younger men that; in his advancing years, Stimson was as thorough in searching and as painstaking in weighing, the accumulated literature of his subjects, as he was in preparing the first edition of his work.

Nor did his age deter him from making two visits to France during the present war. These were on missions of relief for French war orphans, but they included visits to the military hospitals and observations of the treatment there of compound fractures, etc., which he incorporated in his last edition. Stimson had himself served in our Civil War and he gave to the country a Secretary of War, Henry L. Stimson, his son.

Dr. Stimson's literary productions were not limited to medicine. He wrote on many other subjects, publishing, among other things, a translation of Lacombe's "History of France."

In discussions before medical societies, as in his writings, he was keen, accurate, precise, courteously critical. His fine figure and fine diction will be missed.—W. M. B.

The Army and Navy need more doctors—lots of them! Have you offered your services?

Book Reviews

Traumatic Surgery. By JOHN J. MOORHEAD, B.S., M.D., F.A.C.S. Adjunct Professor of Surgery. Surgeon and Adjunct N. Y. Post Graduate Medical School and Hospital; Visiting Surgeon, Harlem Hospital; Attending Surgeon, Park Hospital, New York; Chief Surgeon, Interborough Rapid Transit and New York Railways, etc. Large octavo; 760 pages; 522 original illustrations. Philadelphia: W. B. SAUNDERS CO., 1917.

It may be truly said that the restitution of a severely injured or infected hand is a greater surgical accomplishment than is the performance of almost any abdominal operation; and as a corollary, it must be admitted that the average surgeon is more at home within the peritoneal cavity than among the nerve and tendons of the hand, more expert in removing the gall-bladder or appendix than in managing a fracture of the femur.

This comprehensive work on traumatic surgery is welcome now, when war injuries and industrial accidents claim so much attention; it is doubly welcome as coming from one whose experience in this field has been so extensive; it is thrice welcome because it is an original work, built upon the author's own observations and methods and illuminated with photographs and drawings, but few of which are borrowed from other sources.

Moorhead is an ardent advocate of the exposure of infected wounds to open air and sunshine. It is a plan of treatment that he has tested out for several years. If this open treatment of such wounds will not always accomplish as much as it has in his hands (he states that he has not had to skin-graft any wound thus managed), nevertheless he has done a great service by thus enthusiastically emphasizing the surgical value of aëro- and helio-therapy.

The Carrel-Dakin treatment of wound infections is not referred to. This is a serious omission. Skin-grafting is referred to incidentally but the operation itself, the choice of modes of dressing are not described. This also is a shortcoming. On the other hand, Moorhead includes various topics that do not properly belong in a work on traumatic surgery, *e. g.*, trigger-finger, hammer toe, flat-foot, Dupuytren's contraction, Morton's disease, coxa vara, hydrocele. He includes a reference to subacromial bursitis quite properly since this affection is probably traumatic in origin. His too-brief description and his indications for treatment are, however, quite misleading. He reproduces here the illustrations from Brickner's article on this subject, but he has mislabeled them altogether, in effect, misquoting this author.

The sections on fractures, dislocations and injuries to tendons are quite full and that on injuries due to electricity also deserves especial mention.

We are glad to note that Moorhead practically denies the traumatic theory of the origin of the ordinary hernias —a stand that this JOURNAL has long taken. It is time that inguinal, femoral and unbilical hernias should cease to be made the basis of accident claims and that the surgical profession should enlighten the courts and the casualty insurance companies.

At this writing Dr. Moorhead, a Captain in the Medical Reserve Corps of the Army, is serving with the "N. Y. Post-Graduate" Base Hospital in France. We may expect that his large experience in traumatic surgery will be so much enriched by the study of war wounds that a second edition of his work will contain much new matter. Meanwhile we commend the first edition to those who seek first-information and practical directions.

Manual of the Diseases of the Eye for Students and General Practitioners. By CHARLES H. MAY, M.D., Director and Visiting Surgeon, Eye Service, Bellevue Hospital, New York; Attending Ophthalmic Surgeon to the Mt. Sinai Hospital, New York; Consulting Ophthalmologist to the French and to the Italian Hospitals, New York City; formerly Chief of Clinic and Instructor in Ophthalomolgy, Columbia University. *Ninth edition.* Duodecimo; 440 pages; 377 original illustrations including 71 colored figures. New York: WILLIAM WOOD & CO., 1917. $2.50 net.

We have grown to expect a fresh edition of this very popular handbook of ophthalmology every couple of years. Nine editions have appeared in seventeen years, during which time, aside from four British editions, several have appeared in German, Italian, French, Dutch, Spanish and Japanese and a Chinese translation is now in preparation. Russia is also occupied just now with other matters but we may expect a translation of May's admirable work as one of the first signs of a restoration of order in that country; and no doubt the Philippinoes, the Patogonians and the Esquimoes will also soon fall into line.

This edition shows no great changes although the text has been submitted to general revision.

Therapeutic Exercise and Massage. By C. HERMANN BUCHOLZ, M.D., Orthopedic Surgeon to Out-Patients, Director of the Medico-Mechanical and Hydrotherapeutic Departments of the Massachusetts General Hospital, Boston, Mass.; Assistant in Orthopedic Surgery, Harvard Medical School. Duodecimo; 427 pages; 89 illustrations. Philadelphia and New York: LEA & FEBIGER, 1917.

An outstanding feature of this very interesting manual is that more than many other books on massage it is based on the clinical aspects and the pathology of the affections, the mechanical treatments of which are described. This arises from the fact that the author is himself a surgeon. He has also added much to the value of his work by the inclusion of many case reports. We commend the book to careful reading.

Food Preparedness for the United States. By CHARLES O'BRIEN. Duodecimo; 118 pages. Boston: LITTLE, BROWN AND COMPANY, 1917.

In this small book the author explains how Germany has met the food problem during the war, and discusses various aspects of the problem as it applies to us. He offers many practical methods of food economy on the part both of the State and of the individual. We have found the book both interesting and helpful.

Some Personal Recollections of Dr. Janeway. By JAMES BAYARD CLARK, M. D. Duodecimo; 36 pages. New York and London: G. P. PUTNAM'S SONS, 1917.

This little brochure, written *con amore*, is a charming tribute to one of the commanding personalities in the medical life of New York City during the past generation. In these few sketches the man is revealed as in a series of snapshots: his love of his vocation; his terseness of expression, his consecration to the highest ideals of his art; his helpfulness to the younger members of his profession; his rugged honesty and, above all, his intense humanism. To those who have known Dr. Janeway this book will arouse fond memories; to those who did not, it will serve as a real inspiration.

Progressive Medicine. Edited by H. A. HARE, M. D., Professor of Therapeutics, Materia Medica and Diagnosis in the Jefferson Medical College, Philadelphia; assisted by LEIGHTON F. APPLEMAN, Instructor in Therapeutics, Jefferson Medical College, Philadelphia. June 1, 1917; octavo; 303 pages. Philadelphia and New York: LEA & FEBIGER.

This number contains the following digests: Hernia, by William B. Coley; Surgery of the Abdomen, by J. C. A. Gerster; Gynecology, by John S. Clark; Diseases of the Blood, Diathetic and Metabolic Diseases, Diseases of the Thyroid Gland, Spleen, Nutrition and the Lymphatic System, by Alfred Stengel; and Ophthalmology, by Edward Jackson. These reviews maintain the high standard of previous numbers of this publication.

International Clinics. Edited by H. R. M. LANDIS. Vol. 1 and 2; Twenty-seventh Series, 1917. Philadelphia and New York: J. B. LIPPINCOTT & COMPANY.

These two volumes contain a number of well written and valuable clinical lectures and especially prepared articles on many medical branches, *i. e.*, therapy, surgery, medicine, etc., etc. The volumes are illustrated and supplied with an index.

Of special interest are the following articles: Local Anaesthesia in Surgery of the Colon and Rectum by William M. Beach; Gout and Infectious Arthritis, by Henry A. Christian; The Value of New Ear Tests in Diagnosis, by Isaac H. Jones; and a brief, but well arranged résumé of the progress of medicine during the year 1916.

First Aid to the Injured and Sick.. An Advanced Ambulance Handbook. By F. J. Warwick, B.A., M.B., M.R.C.S., L.S.A., A.K.C., Major, R.A.M.C., and A. C. Tunstall, M.D., C.M., F.R.C.S., L.R.C.P., Major, R.A.M.C. *Tenth edition*, revised. 140th thousand. Duodecimo; 225 pages; 300 illustrations. New York: Wm. Wood & Co., 1917. 80 cents.

This is one of the best first aid handbooks that we have seen. It is written to be of use no less in civil practice than for the work of the war ambulance personnel. The profusion of illustrations and clear directions add much to its value.

Books Received

Military Surgery. By Dunlap Pearce Penhallow, S.B., M.D. (Harv.), Chief Surgeon, American Women's War Hospital, Paignton, England; Captain, Medical Corps, Massachusetts National Guard; First Lieutenant, Medical Reserve Corps, U. S. Army (inactive list); Director of Unit, American Red Cross European Relief Expedition. Octavo; 432 pages; illustrated. London: Oxford University Press, 1917. Price, $5.00.

Blood and Urine Chemistry. By R. B. H. Gradwohl, M.D., Director of the Pasteur Institute, and the Gradwohl Biological Laboratories, St. Louis; and A. J. Blaivas, Assistant in the same; and former Assistant, Chemical Laboratory, St. Luke's Hospital, New York City. Octavo; 240 pages, 69 illustrations. St. Louis: C. V. Mosby Company, 1917. $2.50.

Suggestive Therapeutics, Applied Hypnotism, Psychic Science. By Henry S. Munro, M.D., Omaha, Nebraska. *Fourth Edition*, revised and enlarged, Octavo; 481 pages. St. Louis: C. V. Mosby Company, 1917. $5.00.

Surgical Operations Illustrated by Clinical Observations. By Prof. Fedor Krause, Privy Medical Councillor, Directing Physician Augusta Hospital, Berlin, in association with Emil Heymann, M.D., Chief Physician, Augusta Hospital. Translated into English and edited for American readers by Albert Ehrenfried, A.B., M.D., F.A.C.S., First Assistant Visiting Surgeon, Boston City Hospital; Surgeon, Boston Consumptives' Hospital. In six volumes. *Volume II;* octavo; 715 pages; 373 illustrations. New York: Rebman Company, 1917. $7.00.

Vaccine Therapy in General Practice. By G. H. Sherman, M.D., *Third edition.* Duodecimo, 523 pages. Detroit: G. H. Sherman, M.D., 1916.

Rest, Suggestion and Other Therapeutic Measures in Nervous and Mental Diseases. By Francis X. Dercum, A.M., M.D., Ph.D., Professor of Nervous and Mental Diseases in the Jefferson Medical College, Philadelphia; Foreign Corresponding Member of the Neurological Society of Paris; Corresponding Member of the Psychiatric and Neurological Society of Vienna; Member of the Royal Medical Society of Budapest; Consulting Neurologist to the Philadelphia General Hospital. *Second Edition.* Octavo; 395 pages. Philadelphia: P. Blakiston's Son & Co., 1917. $3.50.

The Surgical Clinics of Chicago. Volume 1, Number 2. 448 pages; 99 illustrations. Philadelphia and London: W. B. Saunders Company, 1917.

Progress in Surgery

A Résumé of Recent Literature.

The Surgical Significance of Gastric Hemorrhage.

Donald C. Balfour, Rochester, Minn. *Journal of the American Medical Association*, August 11, 1917.

Gastric hemorrhages fall into two groups: first, primary lesions in the stomach and duodenum, such as ulcer, cancer, tuberculosis, syphilis; and second, certain diseases and infections, not necessarily associated with recognizable changes in the gastric mucosa. The indications for surgical treatment of a patient with single or recurring gastric bleeding due recognizably from ulcer are positive. According to the experience at Rochester to perform only gastro-enterostomy in such cases is to court recurrence of the hemorrhage, and excision, preferably by cautery or resection, is imperative. The management of the ulcer has been the subject of considerable controversy. As a single ulcer is rarely fatal, the margin of safety usually allows delay until clotting can take place and death occurs only from repeated bleedings at compartively short intervals. Recurrence of bleeding, therefore, after a serious hemorrhage is more than enough to indicate operating at once rather than risk further delay. In repeated continuous small hemorrhages transfusion has been found valuable not only in controlling the bleeding but in adding to the safety of future operations. In the second group of cases without a surgical lesion, a variety of diseases are to be considered: (1) those attended with recognizable changes in the liver or spleen, such as cirrhosis and splenic anemia; (2) cases in which a chronic infective focus, like appendicitis or gall bladder disease is responsible; (3) a group including in the main such acute infections as typhoid, pneumonia, etc., in which no changes can be demonstrated either at necropsy or operation, and cases of "gastrostaxis" of Hale White. The diagnosis is not easy and the difficulty is exaggerated by the fact that in many conditions, such as those mentioned above the appendix, gall bladder, etc., there occur digestive disturbances which can easily be interpreted as due to gastric ulcer and may be the cause of unnecessary operations. The close association of the spleen and liver in normal physiology and anatomy, and in disease processes, calls for the careful consideration of the spleen wherever the portal circulation is involved. The spleen or liver, or both, may be responsible for gastric hemorrhage without themselves exhibiting any other symptom of disease. The treatment by splenectomy of moderately advanced hepatic cirrhosis is yet in the experimental stage, and Balfour does not feel justified in drawing conclusions from the operations performed. Nevertheless he says there appears to be a definite group of so-called primary hepatic cirrhoses due to toxins originating in or elaborated in the spleen. So in those cases splenectomy may be indicated if the spleen is large, and may be looked on as probably curative. It is significant that in those cases of gastric hemorrhage with very slight erosions in the gastric mucosa, micro-organisms may be obtained from these erosions and also from the spleen, and it has been shown that certain encapsulated bacilli will cause gastric and intestinal hemorrhages. Though differing in certain respects they are alike in having the power to produce specific effects on blood-vessels and changes in the blood itself. The spleen must also be recognized as a positive causative factor not only of liver changes but directly or indirectly of gastric bleeding. The group of cases where there is an obvious focus of infection includes cholecystitis, pancreatitis, salpingitis, tuberculosis peritonitis and appendicitis. Gastric hemorrhage may occur and positive diagnosis be possible, but treatment as a rule is successful. The group of cases of serious hemorrhage without demonstrable cause has been the subject of much controversy. Unless the primary cause is found surgical treatment is not clearly indicated and the same is true regarding such acute infections as typhoid, pneumonia, etc. There are several facts that strongly suggest that gastric hemorrhage occurs through the same channel in all, namely, the portal circulation. It is not impossible that these focal infections produce changes in the liver tending to hepatic cirrhosis, and it would seem also possible the resistance of the gastric mucosa can be thus reduced to permit the bacteria, always present, to set up these troubles. The proof that a gastric hemorrhage has taken place is essential and the determination and eradication of the original cause also, whether it is a chronic surgical lesion in the stomach or an extrinsic focus. The general indication of surgical treatment is to operate in the interval. The possibility that many of the extrinsic causes are toxic in nature should be recognized, and also that the infection takes place by means of the portal circulation Hence the liver is of first importance in these heretofore unexplained hemorrhages, and the spleen is also probably an important factor.

Ascending Lymphogenous Renal Infection. D. N. Eisendroth and O. T. Schulz, Chicago. *Boston Medical and Surgical Journal,* July 5, 1917.

1. Anatomical studies have demonstrated the presence of an anastomosing network of lymphatics in the wall of the bladder and of the ureter, communicating above with a similar lymphatic network in the renal pelvis and parenchyma. At its lower end this system communicates also with the lymphatics of the pelvic structures, in both the male and female.
2. Infections of the bladder or lower ureter may reach the renal pelvis or the kidney, either by way of the lumen of the urinary tract or by way of the mural lymphatics.
3. Experimental and clinical evidence indicates that almost complete obstruction to the free passage of urine is necessary for ascent of infection by way of the lumen of the urinary tract.
4. Experimentally we have shown that infection, set up by the simple introduction of bacteria into the bladder without injury or without obstruction, may pass upward by means of the interstitial lymphatics of the ureter.
5. The degree of involvement following the introduction of bacteria into the bladder depends upon the virulence of the organism and upon the susceptibility of the animal. The subsequent tissue reaction may remain limited to the bladder and ureter, it may pass upward to the tissues of the renal pelvis, or even the parenchyma of the kidney itself may become involved.
6. When the kidney tissue is involved in ascending infection brought about experimentally, as described, the path of travel is from the sub-epithelial tissues of the pelvis to the kidney by way of the inter-tubular and perivascular lymphatics.
7. From the kidney the perirenal tissues may become involved through the capsular lymphatics, which anastomose with those of the cortex.
8. The experimental evidence indicates that, in cases of pyelitis and pyelonephritis in the human, secondary to infection of the bladder, the lymphatics constitute the most important course of upward travel of the infection, especially in those cases where there is no hindrance to the urinary outflow.
9. Pyelitis and pyelonephritis, not secondary to cystitis, may also be the result of lymphatic transport of infection from the pelvic organs in the male and female, and from the lower intestinal tract.

Edebohl's Operation in Nephritis in Children. John Lovett Morse, Boston. *Journal of the American Medical Association,* August 18, 1917.

After giving the history and reviewing the literature of Edebohl's operation of nephropexy for the cure of chronic nephritis, Morse reports several cases where the operation was performed in children suffering from nephritis. The explanation of the good results from decapsulation with threatening uremia in nephritis is plain. The kidney is engorged with blood until the capsule is so tense and the internal tension so great that urination is impossible. It does not remove the cause or affect the essential pathologic process. Decapsulation of the kidneys should be undertaken, therefore, in acute nephritis only where there is a marked diminution in the amount of urine, and symptoms of intoxication are developing. In searching through the literature he has been able to find nineteen cases of subacute and chronic nephritis where decapsulation has been done in children, and he give abstracts of them. He has himself had the operation performed in four cases of chronic nephritis of the parenchymatous type, which he reports. It is very hard to understand how the operation can be of any benefit in chronic nephritis, either in children or adults, though it apparently does do good in some cases. This cannot be due to the relief of tension, as in the acute cases, and in lieu of a better explanation he suggests that the improvement is the result of changes in the circulation or functioning of the kidneys initiated by the handling of the kidneys at the time of operation. In the twenty-three cases he mentions that all the patients would have died in a short time without it as they were going steadily from bad to worse. Apparently as a result of the operation, two patients have been permanently cured, one of them remaining well nine years and another eight months. Another was well for two years, and then died of an acute nephritis in no way connected with the previous illness. Two others were well as long as they were under observation, but that was too short to consider them cured. Nine others have improved since the operation, but will certainly die at some time of their disease. He concludes that: "Edebohl's operation is of much value in properly selected cases of nephritis in childhood. It may save life and result in permanent cure in acute nephritis. No child ill with acute nephritis should be allowed to die, therefore, without giving it the advantage of the chance afforded by this operation. It may prolong life for considerable periods in a not inconsiderable number of cases of chronic nephritis, and may possibly, in rare instances, result in cure. It should, therefore, always be considered in all cases of chronic nephritis in childhood, which are not responding reasonably well under medical treatment."

Observations on the Degeneration of Leucocytes in the urine as a Diagnostic aid in Tuberculosis of the Urinary Tract in Women. H. M. N. Wynne, Baltimore, *Johns Hopkins Hospital Bulletin,* August, 1917.

Wynne attempted to corroborate the contention of Colombino that the presence of degenerated leucocytes in the urine was always diagnostic of tuberculosis. He says that degenerated leucocytes are not pathognomonic of tuberculosis of the urinary tract, but marked degeneration is strongly suggestive of the disease. The absence of degeneration does not eliminate tuberculosis.

Results of Deep Roentgen-ray Therapy in 258 Cases of Malignant tumors. A. F. Holding, *American Journal of Medical Sciences,* July, 1915.

1. Roentgen rays give excellent therapeutic results in basal-cell epithelioma.
2. They ameliorate cases of carcinoma of the breast, ovary, and testis, tumors lymphatic structures especially when these tumors are made up of cells of an embryonal type.
3. While we cannot successfully maintain that the roentgen rays have yet proved to be a cure in cancer it is worthy of note that these rays as well as those of radium applied with removal when possible produce more uniform improvements in cancer than any other agents heretofore known, and the use of these agents in cancer is established until some effectual constitutional treatment for cancer is found.
4. Pending the discovery of some effectual constitutional treatment every effort should be made to increase the ameliorating effects of the radio-active methods.
5. Surgery should not ignore the benefits of these methods in the treatment of cancer, particularly in the post-operative raying and treatment against metastases.
6. Most of our improved cases eventually relapsed, and while their lives were prolonged and made more comfortable by the roentgen-ray treatment they eventually died of the disease.
7. In some instances these ameliorating effects were very striking and deserve particular attention in the hope that we may eventually discover means of making these ameliorations more lasting and even permanent.

American Journal of Surgery

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[American Journal of Anesthesia and Analgesia]

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THE RELATIVE TOXICITY AND EFFICIENCY OF CHLOROFORM, ETHER AND NITROUS OXID-OXYGEN ANESTHESIA IN PREGNANCY AND LABOR.*

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Surgeons and anesthetists are pretty well agreed that the anesthetic should be adapted to the operation and the particular needs of the patient. Naturally there is a marked difference of opinion regarding the choice since we are all influenced by our training and the favorable or unfavorable results obtained in individual cases. Statistics would indicate that chloroform is the most dangerous and nitrous oxid-oxygen the safest anesthetic, but one recent writer maintains that nitrous oxid-oxygen is the most dangerous anesthetic, while another states that when given with pure oxygen chloroform is one of the safest. The writer, with many others, has assumed that nitrous oxid-oxygen was the safest anesthetic to use during pregnancy and labor. In his experience there have been no ill effects which could be attributed to the use of the nitrous oxid-oxygen, yet physicians have reported fatalities and other complications which seemed to have resulted from its administration during pregnancy or labor. The reason for this study is therefore evident.

EXPERIMENTAL DETAILS.

The literature shows that a comparison of the former experimental studies of chloroform, ether and nitrous oxid-oxygen is open to much criticism since the anesthetics were administered under very different conditions; without sufficient controls; with the animals in unnatural positions, thereby being subjected to changes from shock; and the quantity of anesthetic used was often excessive for the body weight of the animal. Therefore the writer constructed an anesthetic chamber in which groups of pregnant and non-pregnant animals could be anesthetised under very similar conditions. Each anesthetic was administered in a vaporous or gaseous state. The concentration of carbon dioxid was limited by having a false floor three inches from the bottom of the box under which was placed a solution of lime water or sodium hydrate, and having a ventilating valve near the bottom as well as in the top. The animals had perfect freedom and their condition could be observed at all times through the glass door.

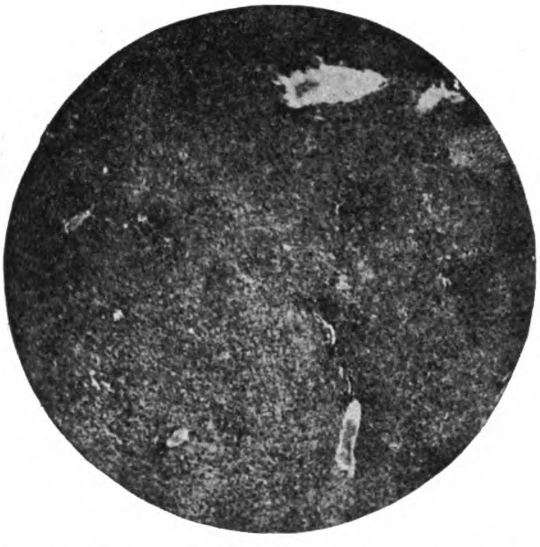

Fig. 1. Extensive central necrosis of liver. Guinea-pig died 22 hours after 6 hours of light chloroform anesthesia. Photomicrograph x62.

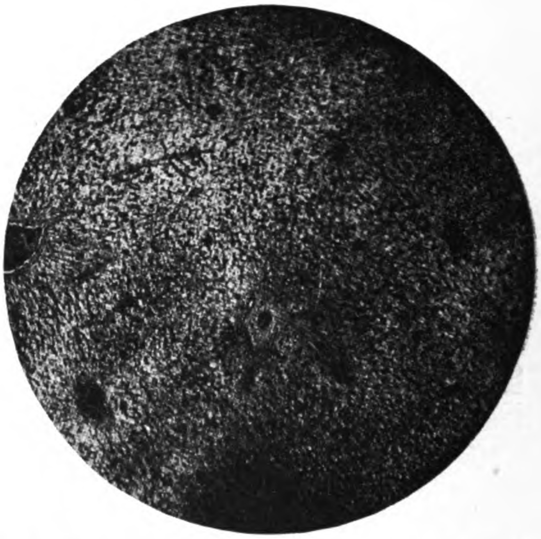

Fig. 2. Marked congestion of the liver of a foetus still-born, after mother had two hours of light chloroform anesthesia. Photomicrograph x62.

The results of this study were reported in considerable detail to the Chicago Gynecological Society, May 18, 1917.

REVIEW OF MAIN GROUP EXPERIMENTS.

I. CHLOROFORM—AIR.

Three pregnant and one non-pregnant guinea-pigs were anesthetised two hours daily until they had six hours of light chloroform anesthesia. After the first anesthesia one pig aborted and ate her young. After the third period a second pig aborted three slightly premature young, and died in convulsions twenty-two hours after the end of the anesthetic. The non-pregnant pig died in convulsions twenty-one hours after the end of the anesthetic. Both adult pigs showed typical central necrosis of the liver, marked congestion of the adrenals and edema of the kidney epithelium. The livers of all three young showed a marked passive congestion, cell destruction and fatty changes. The two surviving adults and the one young guinea-pig born alive subsequent to this anesthesia, had a practically normal appearance of tissue when killed five weeks later.

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* Read during the Fifth Annual Meeting of the American Association of Anesthetists, New York City, June 2, 1917. From the Department of Obstetrics & Gynecology, Rush Medical College, in Affiliation with the University of Chicago and the Presbyterian Hospital.

II. ETHER—AIR.

Three pregnant and one non-pregnant guinea-pigs were anesthetised two hours daily for two days and three hours and fifteen minutes the third period. After the first anesthetic one gave birth to two live young which were anesthetised with their mother the remaining five hours and fifteen minutes. The non-pregnant pig, one of the young, and a normal control animal were anesthetised and killed by decapitation forty-eight hours after the last anesthesia. The livers of these animals showed some loss of staining power and presented a picture resembling that seen after ordinary asphyxiation. This is thought to be a moderate degree of parenchymatous degeneration and tissue swelling. The young pig had evidence of some fatty changes and cell edema. Its mate killed twenty days later had an apparently normal liver. The second ether pig aborted and ate her young. The third pregnant pig delivered two live young nineteen days after the completion of the anesthetic but these died within forty-eight and seventy-two hours after birth. The livers of the etherized pigs were found to be apparently normal twenty-two days after the anesthesia. The two young which died shortly after birth showed loss in staining power of the liver cells and rather marked fatty changes.

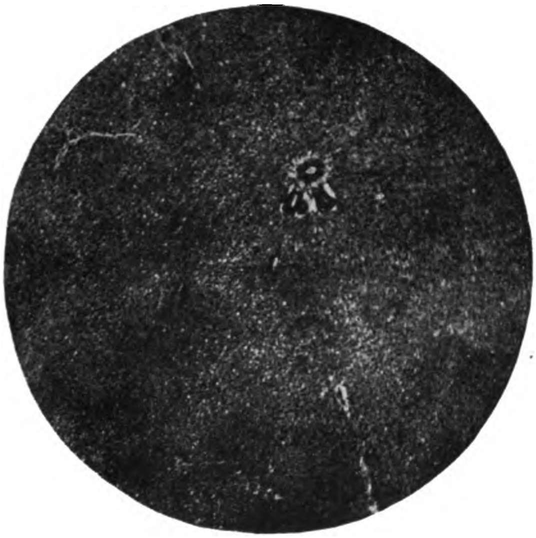

Fig. 3. Liver of young guinea-pig born alive 16 days after 1 hour of light chloroform anesthesia, given with an excess of pure oxygen. Note fatty vacuoles. Photomicrograph x62.

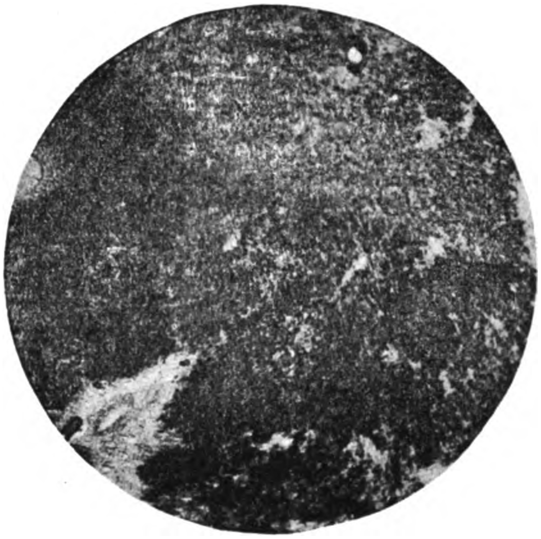

Fig. 4. Sudan III stain of frozen section of tissue shown in Fig. 3. Photomicrograph x62.

The liver changes found after ether anesthesia are of a different type and less severe than those observed following chloroform.

III. NITROUS OXID-OXYGEN ANESTHESIA.

Three pregnant and two non-pregnant guinea-pigs were anesthetised daily for four days until they had a total of seven hours and forty-five minutes of nitrous oxid-oxygen anesthesia. At the end of this period one of the pigs died under an anesthesia from which the others recovered within two minutes after being removed from the box. The sections of its liver showed a pathological condition as evidenced by a marked round cell infiltration. Another pig died of tuberculosis and peritonitis twenty-two days later. It contained macerated young. A third pig which aborted died of pneumonia thirty-two days after the anesthesia. In this experiment all of the young apparently died in utero. The non-pregnant pigs were killed with nitrous oxid asphyxia two months after the anesthesia. The marked peritoneal hemorrhage from the liver of one, and the evidence of bloody serum on the capsule of the liver of both suggests that they had not completely recovered from its effects. A control pig killed at the same time had a marked passive congestion of the liver but no macroscopic hemorrhage from its capsule.

IV. NITROUS OXID-OXYGEN ANALGESIA.

Three pregnant and one non-pregnant guinea-pigs were placed in the box and given a mixture containing from 20 to 30 per cent. oxygen two hours daily for three days. One of the pigs delivered one live young just before the second period and delivered the second while in the box. This young pig lived its first half hour in the mixture. Before the third period a second pig delivered three live young. The four adults and five young pigs were placed in the box for the third period. The remaining pregnant pig aborted the night following the third analgesia. The pig born in the box was found dead the morning after the last period. Twenty-four hours later two more of the young were found dead. Two days later one of the mothers died of peritonitis and forty-eight hours after her death her remaining young died of pneumonia. The still-born young had a marked round cell infiltration of the liver. The pigs dying forty-eight hours after the completion of the analgesia had a passive congestion of the liver, and moderate fatty changes. Those living six days had normal appearing liver tissue. The livers of the adult pigs seemed to be very little affected by the analgesia and appeared normal when killed.

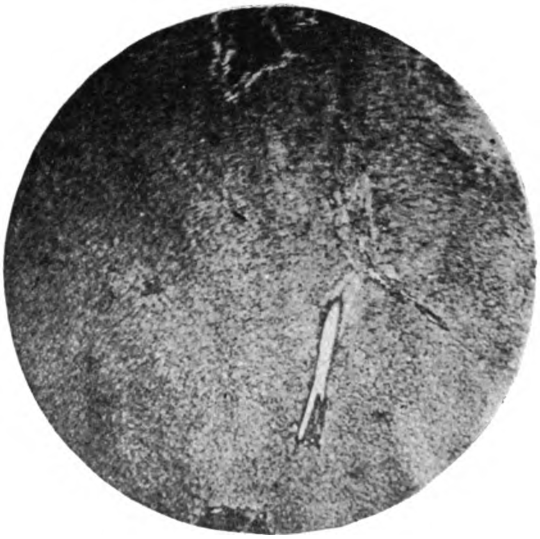

Fig. 5. Liver of normal guinea-pig asphyxiated in bell-jar. Note evidence of congestion and loss in staining power of cells. Photomicrograph x62.

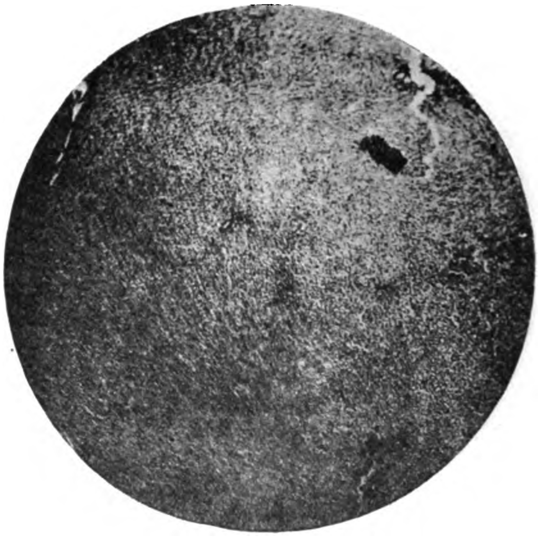

Fig. 6. Liver of guinea-pig killed by decapitation 24 days after 7 hours and 15 minutes of ether anesthesia. Photomicrograph x62.

V. NITROUS OXID-OXYGEN ANESTHESIA, ONE HOUR.

Two pregnant and one non-pregnant guinea-pigs were given one hour deep nitrous oxid-oxygen anesthesia. The non-pregnant pig was killed by decapitation fifteen minutes after the completion of the anesthesia. Its tissues appeared perfectly normal. One of the pregnant pigs delivered four still born young seven days after the anesthesia. The other delivered three premature live and two still-born young thirteen days after the anesthesia. The three young died within a few hours after birth and their livers show the round cell infiltration previously observed in still-born animals. The tissues of the mothers appear normal.

It should be noted that with guinea pigs the larger the litter the smaller the young and the greater the mortality following birth.

VI. CHLOROFORM—OXYGEN, ONE HOUR.

Two pregnant and one non-pregnant guinea-pigs were lightly anesthetised with chloroform, forty gallons of oxygen being passed into the box during the hour of anesthesia. The non-pregnant pig was killed forty-eight hours after the completion of the anesthesia and was found to have a liver which is microscopically normal. The pregnant pigs delivered one and two young respectively sixteen days later. These were killed with their mothers by decapitation forty-eight hours after birth. One of the mothers had yellow areas on the surface of the liver which were found to be fatty. All three of the young had very yellow livers and the sections show that they had a large amount of fat. This is seen in the Sudan III stains of frozen sections.

Various controls were made by killing normal animals with nitrous oxid asphyxia, ordinary asphyxia, etherizing and killing by decapitation, holding and decapitating, asphyxiating with nitrous oxid until respiration had stopped then removing and resuscitating. Sections of liver, lung, heart, adrenals, kidneys and spleen were made from fifty animals. Evidence of hemorrhage from the liver was found after both chloroform and nitrous oxid. None was observed after ether anesthesia.

DISCUSSION.

In the present paper the writer wishes to call attention to a number of points reported in the literature which support the conclusions which he has reached from his experimental and clinical study of chloroform, ether and nitrous oxid-oxygen. He realizes that his results are not conclusive but offers them with the hope that they will stimulate further and more careful studies both clinical and experimental.

The work of Graham, Sansum, Woodyatt and others indicates that "Chloroform is prone to cause swelling of cells, with fat infiltration, necrosis, and a hemorrhagic tendency. Ether has not been observed to cause necrosis, but it may produce milder forms of parenchymatous degeneration and tissue swelling. Nitrous oxid has little tendency to produce any visible tissue changes. The tendency of chloroform, ether, and nitrous oxid to produce suppressions of glucose and nitrogen excretion on phlorizinized dogs parallels their ability to produce changes in which tissue swelling is an important feature. Working with chloroform it is difficult to narcotize phlorizinized dogs for more than 8 to 10 minutes without killing them; although with ether, narcosis was successfully prolonged for two hours." (Sansum and Woodyatt).

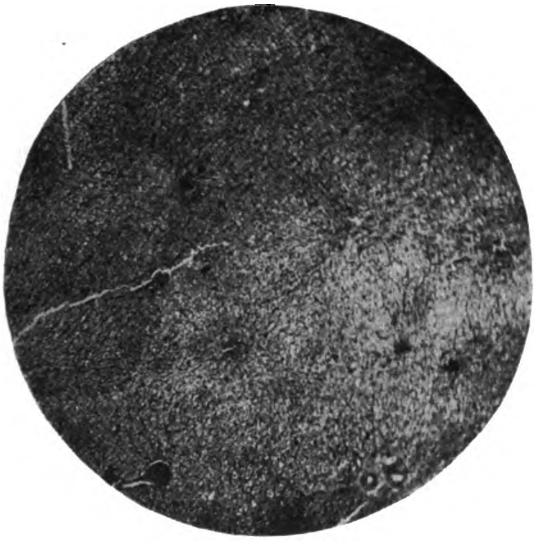

Fig. 7. Liver of normal guinea-pig killed by nitrous oxid asphyxiation. Tissue very similar to that of Fig. 5. Photomicrograph x62.

It has long been recognized that a glycosuria may follow a deep anesthesia. The experiments of King, Chaffee, Anderson, Redelings and others show that when given to healthy animals in sufficient doses, narcotic drugs cause a hyperglycemia with or without a glycosuria, that the rise in blood sugar is at the expense of glycogen, and that this is caused by cell asphyxia. Bradner and Reimann found acetonuria in 61.7 per cent. of Deaver's postoperative cases.

Cases of late chloroform poisoning give clinical confirmation to the laboratory production of the central liver necrosis following the administration of chloroform to healthy animals. The present experiments offer some evidence to disprove Gwathmey's belief that chloroform vapor is made safe by administering it with pure oxygen.

Apart from the possibility of the late poisoning, chloroform may be the exciting cause of death in course of an anesthesia. Levy from his valuable clinical and experimental study states that; "Death from ventricular fibrilations under chloroform may be observed under any of the following and allied conditions.

A. During the induction and early stages of the administration of chloroform and exceptionally late in the administration: (1) during struggling and excitement; (2) on removal of the chloroform; (3) on abrupt administration of the chloroform after removal or its sudden increase during a period of very light anesthesia, and (4) by any combination of these occurrences.

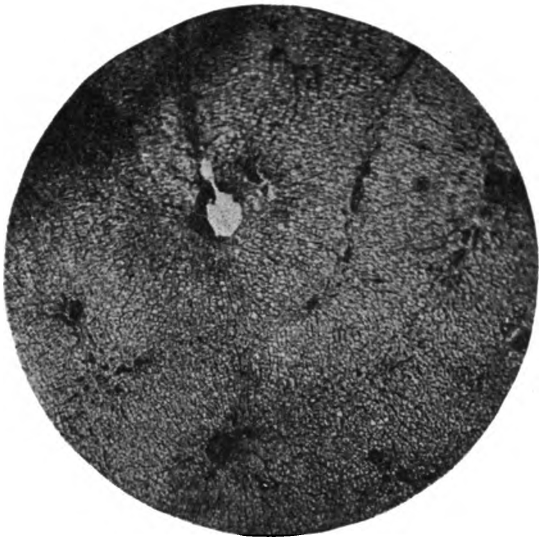

Fig. 8. Note the marked engorgement of liver in guinea-pig killed by nitrous oxid asphyxia 2 months after 7 hours and 45 minutes of nitrous oxid-oxygen anesthesia. Compare with Figs. 5 and 7. Photomicrograph x62.

B. During operation. By strong sensory stimuli under light anesthesia.

C. After operation. On removal of the chloroform, especially after a short operation.

There can be no doubt that all anesthetics cause changes in the blood. Casto in his report on this subject says: "The bibliographic review of this subject would indicate that hemoglobin is always reduced under anesthesia, by chloroform, ether or nitrous oxid-oxygen. Hemoglobin is markedly reduced under ether, and the greatest reduction in pigment is at the end of twenty-four hours, after which there is a gradual return to the normal in about one hundred hours. Under nitrous oxid-oxygen anesthesia the reduction is not only slight, but the return to normal occurs in two to three hours . . . Hemolysis is observed under chloroform and ether, but no degenerated or crenated cells have been found."

Casto states further that: "The acid production of metabolism may be increased under deep anesthesia when cyanosis is permitted to occur or continue; but when a sufficient supply of oxygen is provided, this may be prevented." Yet from the experiments of others it is apparent that some cell asphyxia must result from interference with normal metabolism, regardless of the amount of oxygen in the blood.

The reports of the various writers all indicate that chloroform is the most dangerous inhalation anesthetic. While their statements may not indicate the relative clinical value of ether and nitrous oxid-oxygen, they show that the changes in the adult following the administration of ether are more permanent than those resulting from nitrous oxid-oxygen. Some observations in the present experiments suggest that the cell injury following the use of any of these anesthetics may persist for a longer period than was formerly thought possible, and leads the writer to believe that the anesthetic may be an important factor in some of the more remote postoperative complications as well as the immediate.

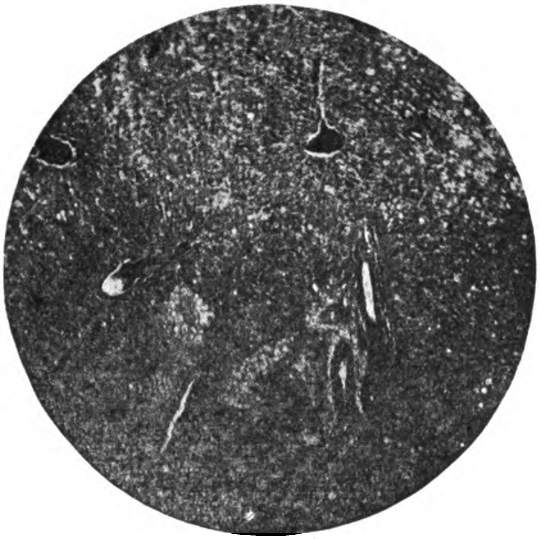

Fig. 9. Liver of young guinea-pig born 23 days after 7 hours and 15 minutes of ether anesthesia and dying within 48 hours after birth. Photomicrograph x62.

There is little or no experimental evidence to suggest a normal individual would die from the proper use of any of these anesthetics during the period of an ordinary operation. It seems probable that sudden deaths under ether or nitrous oxid-oxygen may result from conditions closely akin to those observed by Levy during the use of chloroform. The term, *anesthetic death,* as now used by many surgeons merely indicates that the patient died under the anesthetic, and therefore means nothing. Every surgeon should be a skilled anesthetist, and every anesthetist should have experience as a surgical assistant. Were this the case surgeons would be less prone to blame their errors in judgment on the anesthetist, and the anesthetist could better coöperate with the surgeon.

The choice of an anesthetic during pregnancy and labor involves a consideration of the fetus as well as the mother. The present experiments suggest that in considering only the dangers to the mother we may have been adding to those involving the fetus. They show that the fetus is more susceptible to chloroform poisoning than the mother, and that the long continued administration of nitrous oxid-oxygen anesthesia may asphyxiate the fetus in utero without seriously endangering the life of the mother. The danger to the fetus from nitrous oxid is apparently not completely removed by adding oxygen in the percentage found in air. Ether anesthesia seems to be better borne by the fetus in utero and the very young than is chloroform or nitrous oxid-oxygen. Therefore these experiments would suggest that ether, unless contraindicated, is the inhalation anesthetic of choice for operations during pregnancy.

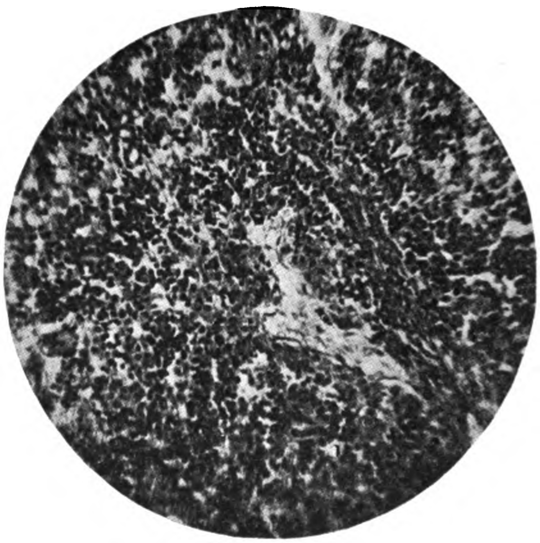

Fig. 10. The marked round cell infiltration is an indication of the primary pathology in a pregnant guinea-pig dying just before the completion of 7 hours and 45 minutes of nitrous oxid-oxygen anesthesia. Photomicrograph x288.

FACTORS DETERMINING THE CHOICE OF ANESTHETICS IN LABOR.

During labor many factors must be considered in the choice of the anesthetic. Pain does not begin with the first evidence of the uterine contraction but at or near its height. Once pain is established little can be done to relieve the suffering from that contraction. Therefore the value of an anesthetic depends upon the quick induction of analgesia at the very beginning of a contraction. For this purpose chloroform vapor and nitrous oxid-oxygen gas are equally effective. The quick administration of ether vapor gives a considerable relief in many cases but it is less efficient than the others. However, both chloroform and ether tend to lessen the strength of the uterine contractions; they are eliminated slowly and gradually accumulate in the system; and babies born under these anesthetics may have the anesthetic in their systems for many hours after birth.

Nitrous oxid-oxygen as used in normal labor, given only during the first few inhalations at the beginning of a contraction, is very efficient and undoubtedly the safest anesthetic that has been employed. It seems probable that the fetus can absorb very little of the anesthetic during the contraction, and nitrous oxid is so quickly eliminated that very little will remain in the maternal blood at the end. Therefore, there is not the cumulative tendency of chloroform or ether, and the normal metabolism of the fetus is not disturbed during the interval between contractions.

CONCLUSIONS.

The following suggestions are offered in conclusion.

1. Chloroform, regardless of the technic employed and the amount of oxygen supplied, is the most dangerous anesthetic to both mother and fetus.
2. Nitrous oxid-oxygen anesthesia interferes with the oxygen supply of the fetus in utero and if given over a considerable period may cause its death. There is probably very little danger to the fetus during an examination or short operation if the nitrous oxid-oxygen is administered skillfully without cyanosis.
3. The continuous nitrous oxid-oxygen analgesia while less dangerous to the fetus than the anesthesia, should not be administered over long periods.
4. Ether, unless otherwise contraindicated, is the anesthetic of choice for operations during pregnancy or labor.
5. Nitrous oxid-oxygen administered intermittently at the very beginning of the contractions is the analgesic of choice for normal labor. When this is not available, ether, though less efficient, may be administered in a similar manner at a minimum of expense.
6. The term *anesthetic death* as often used means nothing.
7. There are no statistics which would indicate that the use of anesthetics to lessen the pain of labor has *per se,* increased either fetal or maternal mortality.

25 EAST WASHINGTON ST.

SOME OBSERVATIONS ON THE IMMEDIATE AND REMOTE EFFECTS OF NITROUS OXID-OXYGEN ANESTHESIA AND ANALGESIA IN OBSTETRICS.*

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My appearance before you this afternoon through the kind request of your Secretary, is not for the purpose of teaching you how to administer a gas oxygen anesthesia or analgesia, as I am not a specialist in this particular branch of practice. However, my thirteen years of general practice and my special work in pediatrics have lead me into the newer methods for the relief of suffering humanity, which, together with a close study of the standards of hundreds of other men in the profession have enabled me to make observations somewhat at variance with many of the currently accepted views.

My observations, therefore, are not confined to a study of my own cases, but are the product of the observations of the experiences of hundreds of men and hospitals throughout the United States and cover a period of a year and a half. During this time I have corresponded with anesthetists, obstetricians, general practitioners, both city and country, pediatrists, hospitals and nurses, while the total number of cases which this paper may be said to have covered is approximately eight thousand.

But since our limited amount of time makes it impossible to go into all phases of the subject, I shall confine my discussion to the dangers to the baby:

In order that no prejudice may enter into this discussion permit me to state that there are two classes of men interested in this important subject: (1) Those who honestly believe there is absolutely no danger to the mother or the baby neither immediate nor remote through the use of nitrous oxid-oxygen in labor, and from their experience it would seem to be so; in fact it would seem that their experience should be that of every other man who uses gas in labor. This class of men seem to be in the great majority. (2) On the other hand there are those who believe there are elements of great danger not only to the mother but also to the baby, and their experience has taught them some important facts, which I wish to bring to your attention. This latter class seem to be in the minority. In order to place these opposing views before you, I shall first give you the ideas of those men whose experience has taught them there is no danger in the use of gas-oxygen in labor to the baby or mother neither immediate or remote and I shall begin with the opinion of Dr. Carl H. Davis of Chicago, who is one of the foremost users of gas in labor and has used it extensively at the Presbyterian Hospital in Chicago. To quote from his letter: "There is no apparent effect on the baby. A critical study of all cases delivered in the maternity department of the Presbyterian Hospital during a period of six months shows that the babies of mothers treated with the analgesia lose less weight during the first week than did those of mothers not given the gas. There is no variation in fetal heart tones of over five per minute and then only once in a case where gas was used for ten hours. Less effect on babies than either chloroform or ether." These observations are more or less corroborated in a degree by such men as Drs. Reed of Chicago; Barbara Hunt of Bangor, Me.; Allen of Brooklyn; Dobbin and Bergland of Baltimore; Stone of Beverly, Mass.; Allen of Colorado Springs; Meyer of Louisville; Nubbard of Boston; Sullivan of Lakeland, Fla.; Mercy Hospital, Chicago; Clark of Walter, Dakota.

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* Read during the Fifth Annual Meeting of the American Association of Anesthetists, New York City, June 2, 1917.

Dr. Darling of Milwaukee, observed the following: "The first cry is earlier and lustier and the general condition is better than other babies." Dr. Morrison, Springfield, Ill., "No appreciable effect on baby." Dr. J. B. DeLee, Chicago, "No deleterious effect on baby for I give ether at the end of second stage." Dr. Henderson, Louisville, "No danger to baby if mother does not become cyanotic." This expression I have noted in many of my letters and please note it carefully as I hope to be able to refute the same later.

Dr. Sweet, Fresno, Cal., "No ill effect on baby before nor after delivery." Dr. Gossett, Louisville, "Absolutely no ill effect if anesthetist knows his business." Dr. R. W. Holmes, Chicago, "No effect on baby." Drs. E. I. McKesson and Dice of Toledo, "No effect on the baby." Drs. Grant, Newell, Kellogg and Irving, Boston, "Avoid cyanosis in mother and there will be no ill effect on baby." Dr. Hamilton Long, Louisville, "There is no danger to the child if the gas is in the hands of one expert in its use. Avoid cyanosis in the mother to avoid trouble in the baby." Dr. Louis Frank, Louisville, "We have had no ill effects either on mother or babe immediate or remote." Dr. W. H. Browne, Detroit, "Cannot notice any untoward effect upon the baby." Dr. Arthur B. Coon, Little Rock, Ark., "No ill effect on baby." Dr. S. Rothenberg, Cincinnati, "Even after prolonged labor, no ill effect noticed." Dr. Hoag, San Francisco, "As far as I have been able to see, there is no deleterious effect on the baby."

Dr. A. E. Guedel, "Nitrous oxid gas as applied in obstetrics has no apparent effect on either the mother or babe." (American Year Book of Anesthesia and Analgesia, 1915-16.)

From the foregoing expressions of faith in the absolute safety of nitrous oxid-oxygen in labor, and coming from so prominent and experienced men as have been quoted, it would seem that there is no room for argument. The medical literature is painfully silent regarding any untoward or dangerous effects on the baby, and until I took up the use of gas in labor, and studied its effects on the baby, and later proceeded to investigate the experiences of hundreds of men throughout this country who are using this method, I must admit that I too, believed in the absolute safety of this anesthetic, both to mother and baby, and expected it to be used unreservedly by the medical profession throughout the country. But such is not the case.

I am sure you will all understand how difficult it is to get men to admit any serious happenings in their experience. But when hundreds of men are reached by personal letters, one is certain to obtain the true experiences of some of them. This does not mean that the experiences above enumerated are not the true ones of those who were so kind as to answer my questions. But such personal letters as I have written have been instrumental in bringing out cases never reported before, and unless reported in this way would never be heard of. And if my paper will establish the fact that there are always elements of danger to the baby in the use of nitrous oxid-oxygen whether administered by an expert or a novice, and this danger is not past until twenty-four to forty-eight hours after the birth of the child; and furthermore, if it will establish a method whereby such danger may be reduced to a minimum, then my time and effort will not have been spent in vain.

Many of the men quoted above have never seen in their practice any untoward or dangerous effects on the baby, while other have expressed themselves as believing certain conditions might cause deleterious effects. There are still others who have actually seen these dangers occur either in their own or some one else's practice.

To quote further from some of my letters: Dr.

J. B. DeLee, Chicago, "No deleterious effect on the baby in my experience for I give ether at end of second stage. Do not use gas longer than three hours as there is great danger of hemolysis." Dr. E. Tuley, Louisville, "I have only seen one case in which I could attribute asphyxia of the baby to the use of gas, that one occurring recently in a multipara with second stage prolonged over an hour; gas was given fifty-five minutes; baby cyanosed, but breathed and cried promptly, and all blueness gone in ten minutes after birth." Dr. Bacon, Chicago, "When gas is given for some time before the birth of the child in a high degree of concentration, I believe that the baby is more apt to be asphyxiated than where ether is given. Occasionally I have to work sometime to resusciate the child, but have never lost one." Dr. Breitstein, San Francisco, "When 95 per cent. nitrous oxid is being given the fetal heart tones are stronger; 6 per cent. were asphyxiated but all resuscitated." Dr. Darling, Milwaukee, "Does not advocate the general use of gas unless familiar with its use." Dr. Palmer Findley, Omaha, "I regard gas analgesia as more dangerous than ether, and less satisfactory from the standpoint of expense and efficiency. More cyanosis in the babies; about 25 per cent." Dr. Brant, Boston, "We make a strong point about avoiding too deep anesthesia with cyanosis, for we believe the dangers, theoretical and clinically proven, such as increased blood pressure and decreased coagulating power of the blood, are present if at all, only when *carbonization* of the blood has taken place. As a result we are opposed to the use of oxygen and ether adding machines as offering temptation to too deep degrees of anesthesia." Dr. Hewett, Chicago, "Less asphyxia if oxygen is given at once before the cord is tied." Dr. Darling, Milwaukee, "Oxygen to mother resuscitates baby quickly." Dr. Clapp, South Bend, "While the cord is still pulsating give oxygen to mother and baby becomes pink at once." Dr. Hoag, San Francisco, "Immediately following delivery, I have always switched on pure oxygen so that most of the babies are hyper-oxygenated before the cord is tied."

Dr. A. J. Skeel, Cleveland, writing in The Jour. A. M. A., March 11, 1916, said: "I wish to enter a vigorous protest against the advice at present being so freely given that any one may use gas in labor cases with perfect safety. Gas is a powerful therapeutic agent with infinite possibilities for harm at the hands of incompetent or careless users. The statement has been made and is, I believe accepted, that gas in the hands of an expert is a safe anesthetic, but the most dangerous anesthetic if given by a novice. Even in analgesia some knowledge and experience are necessary to secure both safety and satisfaction from its use. Moreover, the temptation to follow gas analgesia labor with gas anesthesia for repair is so obvious that I would earnestly urge all those expecting to adopt this method to spend sufficient time in special study of the agents he is to use, so that he can direct its administration. Free use of gas by the inexperienced will surely lead to tragedies."

In looking back over these last quotations from so many prominent men, is it not true that we must look for some of these so-called tragedies? It is almost like a forecast of what will surely occur sooner or later. To quote from another letter, a physician, whose letter I hold in my hands: "I am glad to give you any information possible in regard to the death of my baby, and will answer your questions as follows:

(1) *What length of time was gas oxygen used?* Nitrous oxid-oxygen analgesia was given for about four hours.

(2) *Did mother show cyanosis at any time?* At no time did the mother become cyanotic; in fact, she did not lose consciousness at any time.

(3) *Was any other anesthetic used?* Small amount of chloroform was used for only a short time during delivery since gas did not seem to control the pains.

(4) *Was an autopsy held and its findings?* The autopsy was performed by Dr. Rawlson of Presbyterian Hospital, and absolutely no cause for death could be found.

(5) *Was pituitrin given at any stage of labor?* Pituitrin was given to mother but the consultant on the case could see no reason for believing the death was caused by this drug." The consultant's letter read as follows: "This baby took sick about twenty-four hours after birth with convulsions. These convulsions were recurring and the child was a picture of acidosis. Acetone odor to breath, red lips, slow pulse, respiration disturbed but not of Cheyne-Stokes type. Pulse became slower and baby died in less than forty-eight hours after birth."

This is one of the four cases I know of which has taken the same course. In all of them gas was given for several hours, more or less continuously, before delivery. No pituitrin was given in these cases to my knowledge with the exception of the first case.

Conclusions.

In studying the hundred cases in my own practice where gas-oxygen was administered by my own trained nurse, I have reached the following conclusions:

(1) That more than twenty-five per cent. of

babies delivered by gas analgesia show a slight crowing inspiration immediately after birth which may last for twenty-four to forty-eight hours. This is an entirely different condition from that encountered when mucus has been drawn into the larynx. It is more like a slight paralysis of the epiglottis with a resultant snoring sound.

(2) That this condition of a crowing inspiration is very much exaggerated where *rebreathing* is used to any great extent.

(3) That this condition of a crowing inspiration is never present for more than a few breaths if the mother is given plenty of oxygen while the cord is still pulsating, but that it may last for hours if oxygen is not given.

(4) Unusual muscular twitching lasting for about twenty-four hours but not seen if oxygen is used freely for first twelve hours after birth.

And from my study of the eight thousand collected cases here reported, with my own cases included, I have reached the following conclusions:

(1) That rebreathing is extremely dangerous to the baby and has no place in obstetrics.

(2) That air and gas are less dangerous than *rebreathing;* but slightly more dangerous than when oxygen is used and not as efficient as gax-oxygen.

(3) That nitrous oxid-oxygen anesthesia, in proper percentages for each individual case (this to be determined at the bedside), is a most wonderful help to the mother, and may even annihilate all labor pain; but that it is impossible to rule out all danger to the baby even though the mother may show no cyanosis.

(4) That nitrous oxid-oxygen anesthesia when used longer than three hours becomes dangerous to the baby by reason of the hemolysis which occurs in the mother's blood. This may occur in the baby's blood.

(5) That high blood pressure in the mother with pre-eclamptic toxemia is a contraindication to the use of gas-oxygen. Under these conditions it is not only dangerous to the mother, but also to the baby.

(6) That it is never safe to use gas where the mother is suffering from hyperthyroidism.

(8) That every baby showing a crowing inspiration at birth, or where the mother during labor has complained of a marked dryness of the throat while taking nitrous oxid, should be allowed to absorb all oxygen possible from the mother before the cord is tied, the mother receiving pure oxygen until cord stops pulsating.

(9) That the babies are safe for three hours of a gas labor providing mother is never allowed to become cyanosed and nitrous oxid is not used above eighty per cent. the other twenty per cent. being oxygen, not air.

(10) That when gas is used longer than three hours, there is great danger of a condition developing in the baby simulating the late deaths from chloroform or ether narcosis: and perhaps identical with the conditions we call acidosis.

(11) That when gas is used in a high degree of concentration for longer than three hours, the baby should receive not only all the oxygen possible before the cord is tied, but it should be further resuscitated by the giving of pure oxygen, more or less continuously, for from twenty-four to forty-eight-hours after birth. This should be done as a routine in order to avoid a condition simulating the cases of postoperative narcosis from ether and chloroform and which, for want of a better term I have called *acidosis.*

(12) That the expression *carbonization of the blood,* used by so many men to describe a theoretical condition in the baby, is a misnomer and means absolutely nothing. My authority for this statement is Prof. Carlson of the University of Chicago. The term should be supplanted by an expression which would better describe the true state of the blood. And since carbon dioxid and nitrous oxid do not in any way combine with hemoglobin in the blood, but only starve the body cells of oxygen and thereby cause retention of the acid products of metabolism, might not this condition in the baby or even in the mother be properly called *nitrous oxid acidosis.*

(13) That my correspondence shows conclusively that the following quotation from Palmer Findley, of Omaha, is almost, if not, absolutely correct: *"I regard gas analgesia as more dangerous than ether, and less satisfactory from the standpoint of expense and efficiency: and that about twenty-five per cent. of the babies are cyanotic."*

(14) That many general practitioners, especially those in the country far away from hospitals and assistants have already discarded their gas machines as being too cumbersome and expensive, as well as inefficient and dangerous when compared to the almost perfect safety of ether.

(15) That the following expression of Guedel from the Year Book of 1915-16, that "the time will soon come when this gas may be left with the nurse or experienced attendant, and the woman in labor be enabled, by self administration, to secure relief safely with analgesia for any number of hours, leaving the physician free to come and go at will," is far from realization and probably will never be realized.

ABSTRACT OF DISCUSSION

DR. JOHN OSBORN POLAK, Brooklyn, N. Y.: I have been particularly interested in Dr. Davis' researches and in

Dr. Ferguson's record of immediate and remote effects of nitrous oxid-oxygen on the child. Too much emphasis cannot be placed on the dangers of delayed chloroform poisoning, the incidents of which has again been so strikingly demonstrated in Dr. Davis' guinea-pig experiments. In instances of chloroform poisoning large amounts of the drug have usually been given and its occurrence may not occur for some days. We have been using gas-oxygen in our clinics, as a routine analgesic in labor for a period of two and a half years. We can indorse and confirm much of what Dr. Ferguson has developed in his canvass. The difficulty of hitching the anesthetic to the obstetrician may account for the success of one method in a certain clinic and its failure in another. When scopolamin-morphin narcosis for obstetrical amnesia was introduced in this country there were a number of deaths on account of prolongation of the second stage of labor. In these instances it is not the anesthetic that produces death, but the changes in the child due to the prolonged labor. Of course in any prolonged labor the anesthetic also causes complications, especially chloroform. Labor should be so conducted that the second stage is not prolonged, for if it several hours, even under gas-oxygen, you will get a cyanotic baby, with a great deal of mucus in its airway, and it will have to be resuscitated. A prolonged second stage under ether-oxygen, or without any anesthetic would similarly effect the baby. The three methods of anesthesia, now in routine use, each have their place in the conduct of painless labor. Scopolamin-morphin is ideal for the first stage, gas-oxygen for the second stage and for complete labor in uncomplicated cases; and ether-oxygen is the anesthetic of choice for operative obstetrics. While none of these methods are absolutely safe, in the sense that they cannot be used with impunity, they do not injure the mother, and if used judiciously, the baby can be delivered in as good condition as if no anesthetic had been used.

Dr. Charles K. Teter, Cleveland, Ohio: Nitrous oxid-oxygen anesthesia is not an obstetrical panacea. However, my continued use of the method, since presenting the subject in my Presidential address before this Association two years ago in San Francisco, convinces me that the method is a good one in its proper place. In consulting Dr. A. J. Skeel, who has used the method extensively, he informed me, just before this meeting, that he was obviating the occurrence of perineal lacerations by the addition of ether. The use of nitrous oxid alone or with air may stimulate the respiratory efforts of the baby and account for the excessive mucus in the baby's throat. All cases of cyanosis have readily responded to oxygenation. Dr. Davis is to be congratulated on his researches in the physio-pathology of these various methods of anesthesia and adding so much to the sum total of our knowledge on the subject.

Dr. John R. Worley, Dallas, Texas: I have been using gas-oxygen analgesia and anesthesia as a routine in labor for some years, and in a paper, recently read before the Gynecological Section of the Texas State Medical Society, I went so far as to state that there were no contraindications to its use, and that in my personal experience I had seen no detrimental effects on either the mother or baby, and have seen more pulmotor resuscitation on the other fellow's babies, in labors in which no anesthetic had been employed. I have seen no dead babies in ordinary deliveries under gas-oxygen. We have lost babies in deliveries requiring forceps or surgical interference, especially in breech presentations. In one patient, with a cardiac complication, nitrous oxid-oxygen was used for eight hours during labor and this patient and baby survived and are now living. We lost the baby in a breech case that lasted 18 hours. In reference to the effects of nitrous oxid-oxygen on the fetus in utero, I have never known of a pregnant woman, coming to operation under this anesthetic, for some surgical procedure, to abort. Not long ago one of my confrere's wife, five months pregnant, was operated under gas-oxygen and a cystic ovary was removed. She went to term and was delivered of a healthy child, now living.

Dr. R. Ferguson (Closing): In investigating the clinical side of this subject it was my object to find out if gas-oxygen was safe in every individual case. The records I have collected speak for themselves, and from these observations, as well as Dr. Davis' researches, it must be concluded that there are contraindications to the use of nitrous oxid-oxygen anesthesia and analgesia in labor and dangers, especially to the baby, which must be guarded against, before it can be called entirely safe.

Dr. C. Henry Davis (Closing): Clinically, in its use in many cases, I have found nitrous oxid-oxygen safe and harmless in labor; but I fully realize its theoretical dangers, and the fact that other methods of anesthesia have their place in obstetrics.

VASCULAR REFLEXES WITH VARIOUS TENSIONS OF ETHER VAPOR.*

Frank C. Mann, M. D.
Rochester, Minnesota.

The study of ether percentages by Boothby,[1] who showed that in man all individuals become anesthetized at a definite tension of ether, and the introduction by Connell,[2] of the anesthetometer, an instrument adopted to accurately administer definite and known tensions of ether, have opened a new field for the investigation of physiological phenomena in relation to anesthesia. This is of importance, not merely in regard to the process of anesthesia but also in regard to the many physiological problems, the study of which compels the use of an anesthetic.

The physiological investigator employing anesthetized animals has usually been content to state that the animal was lightly anesthetized or deeply anesthetized as the case might be. While this may mean a fair degree of accuracy by each individual investigator for any particular series of experiments it certainly does not mean the same in all instances because what might be a lightly anesthetized animal to one would appear deeply anesthetized to another. Furthermore, difficulty is experienced in attempting to corroborate the work of any investigator because of the anesthetic factor. This has been repeatedly emphasized by Boothby.

The non-standardized state of anesthesia in regard to physiological research has probably been partially responsible for contradictory data concerning different problems. It has undoubtedly been a factor in the shock problem and may be responsible for some of the debated problems in regard to blood pressure and respiration.

The present research was undertaken to determine to what degree blood pressure and the vascular reflexes are modified by the different tensions of ether, and to establish an optimum range of tensions for these reflexes.*

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* Read during the Fifth Annual Meeting of the American Association of Anesthetists, New York City, June 2, 1917. From the Department of Physiology, Mayo Clinic, Rochester, Minnesota.

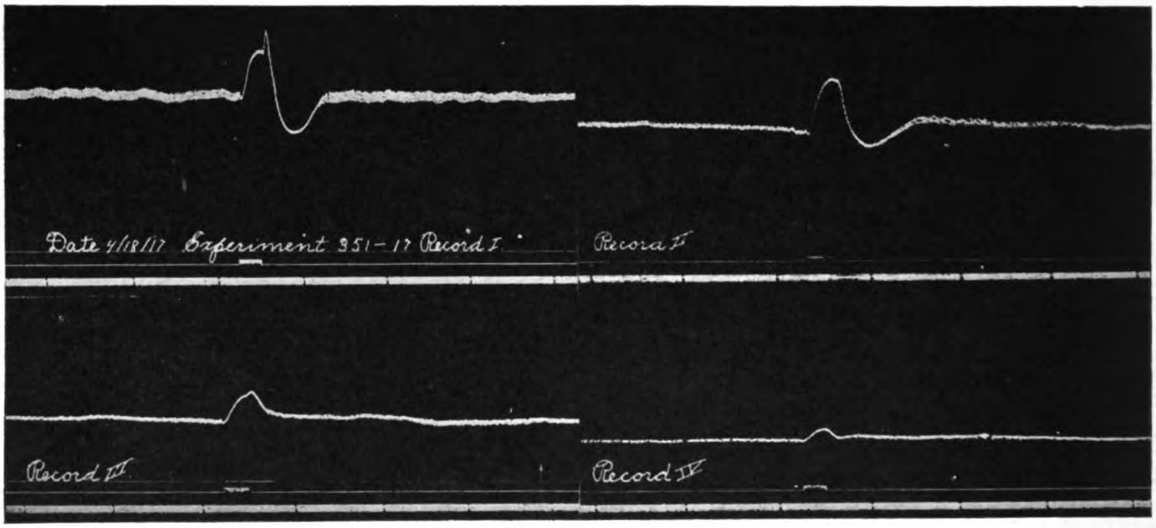
*When I first thought of working with the Connell apparatus I intended to establish a standard of ranges of anesthetic tension for each species of the common laboratory animals. One range would include the optimum tension for physiological work and another the tensions which are liable to prove fatal. In a discussion of the subject with Dr. W. Boothby he suggested that I finish a

The particular Connell apparatus obtained was made by a new manufacturing company and was not mechanically correct. When calibrated by the method described by Boothby and Sandiford[3] it was found to deliver a tension considerably less than it was supposed to be standardized for and there was a wider range of variation than desired. It is hoped that an instrument which can be calibrated as closely as Dr. Boothby's will be secured for finishing the problem.

The tensions found necessary for work on the dog as used on the apparatus were between 40 and 64. These available tensions when calibrated by means of the Waller gas balance were found to have approximately the following values:

Tension on Connell.	Tension on Waller.
40	36.4
44	38.1
47	43.6
51	44.1
53	49.2
54	48.4
58	50.7
61	54.5
64	55.1

I am indebted to Miss Sandiford for invaluable aid in calibrating the apparatus.



Experiment 351-17. Kymograph record showing effect of various tensions of ether on the pressor reflex of the vagus. There was an interval of one hour between each record. Nerve stimulated: Central end left vagus; right vagus sectioned.

	Ether tensions (Approximate)	*Blood pressure reaction.*
Record I	36	Increased from 138 to 194 then dropped to 105.
Record II	43	Increased from 104 to 150 then dropped to 90.
Record III	48	Increased from 54 to 80, maintained.
Record IV	50	Increased from 35 to 48, maintained.

In the calibration no account was taken of the alcoholic content of the ether and the apparatus was run in practically the same manner as used in the experiments. While there was considerable variation the actual tension of ether must have been very nearly that computed on the Waller balance. Owing to this wide variation of tensions due to the apparatus, only approximate tensions will be given now and later I hope to check them with a more accurate instrument. The experimental results will be expressed in approximately the corrected tensions.

All experiments were performed on dogs. The animals were etherized by means of a cone or cabinet and after intubating a definite tension of ether was administered. This was usually the lowest tension compatible with operative work. The apparatus was arranged to record carotid blood pressure (mecury manometer) and respiration. The desired nerves were carefully prepared in the usual manner and all precautions were taken to preserve them in a normal condition. All stimulating was done with a platinum or shield electrode and a Kronecker inductorium using a primary current derived from storage batteries. While no effort was made to standardize the stimulus, great care was taken to keep it constant for each experiment. When pressor reflexes were desired, the strength of stimulus and rate were made far above the threshold for these reflexes. Both were decreased for depressor reflexes.

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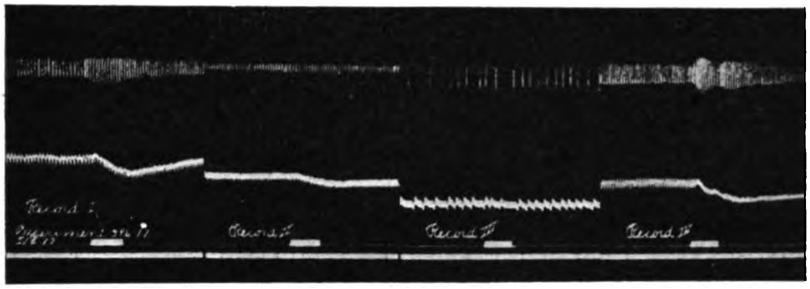
problem which he had started with Dr. W. T. Porter, in regard to the vascular reflexes with various tensions of ether. Unfortunately Dr. Boothby was called to the war before the work was completed. For this reason, as well as the fact that the particular instrument used was found to have a rather large coefficient of error, this paper must be considered as a preliminary report.



Experiment 396-17. Kymograph record showing effect of various tensions of ether on depressor reflex of sciatic. There was an interval of one hour between each record. Nerve stimulated: Central end right sciatic.

	Ether tensions (Approximate)	*Blood pressure reaction*
Record I	36	Decreased from 100 to 78.
Record II	43	Decreased from 80 to 70.
Record III	44	No change.
Record IV	Air	Decreased from 70 to 50.

Note that the reflex disappears under a relatively low tension.

Vascular reflexes obtained in an animal with intact respiratory mechanism are affected by the changes in respiratory movements. To obviate this curare was used in a few experiments but it was found that even with the greatest care the product which can be obtained now was too toxic. However as this is only a comparative study for each animal the respiratory factor is not great enough to seriously affect the general results.

One hour was arbitrarily chosen as the time necessary for the ether in the tissues to reach the same tension as in the alveolar air. From the careful observations in these experiments I believe that one hour is fully ample. Care was taken not to fill the apparatus within 15 minutes before stimulating.

After administering the anesthetic at a constant tension for one hour the nerves were stimulated for a definite time, usually fifteen or thirty seconds, and the changes in blood pressure and respiration recorded. Then the ether was changed to another tension. After all the desired tensions were used the animal was either given air or a very low tension and the nerves stimulated. This was done in order to be sure that the nerves were still functionating. However, the results show that on the whole this was not necessary because in only two experiments were the nerves found to be badly injured.

In general, the physiologic phenomena occurring under ether were found to be remarkably constant at the same tension in different dogs.[4] While the effects of different tensions upon blood pressures, the vascular reflexes, respiration and the respiratory reflexes were not always progressive or absolutely constant, yet there were certain narrow limits of tension within which certain changes always occurred. However, with a very accurate apparatus I believe all the reflexes will be found to be proportioned to the anesthetic tension used.

It was found that the lowest tension compatible with operative work on the dog was approximately 36. At this tension all the operative procedures necessary for the experiment could be carried out but the animal was always very lightly anesthetized and it was usually necessary to administer the ether for over half an hour at this tension before beginning work. This tension was too low for satisfactory routine work.

The optimum tensions for operative work are probably between 38 and 45. At these tensions the animal reacts slightly to operative procedures but the condition remains excellent. As the ether tension is increased above 36 the animal progressively exhibits the signs of deepening anesthesia but the condition remains good until a tension of 48 is reached. The range of ether tension between 36 and 48 is the range of surgical anesthesia in the dog. While blood pressure and respiration may both be greatly depressed it seems impossible to kill an animal with any tension within this limit provided time is not allowed to become a factor.

When the tension is increased above 48 the animal becomes profoundly anesthetized and respiration is liable to fail and blood pressure to decrease to a very low level. This may occur at any tension above 48 and 60, but usually it takes place at tensions between 50 and 55. In all probability a dog cannot withstand a tension above 60. None in my series has ever been able to withstand a tension of 60. The range of tensions between 48 and 60 is the limit of viability for the dog. Any tension within this limit may prove fatal to the animal.

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[4] This corresponds to the results of Boothby in man.

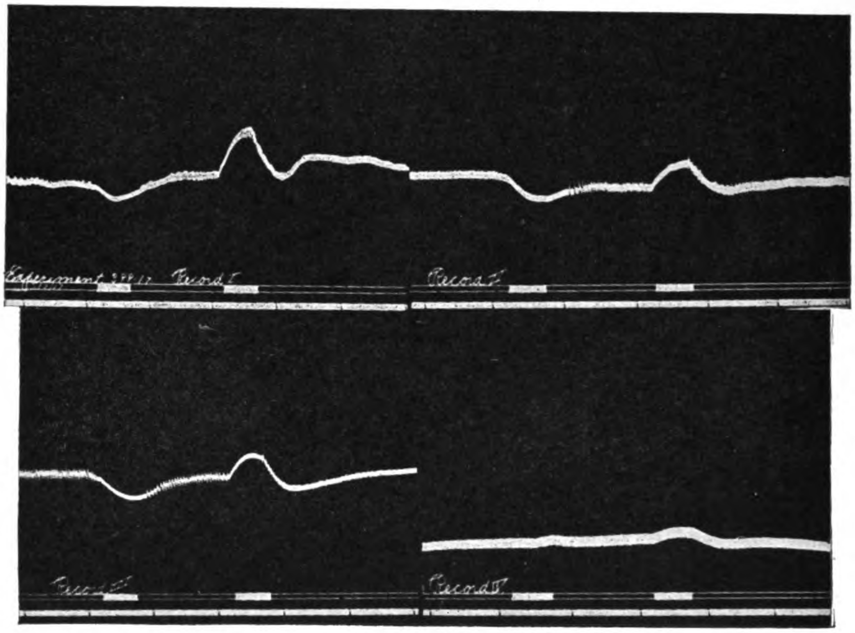
The corneal reflex is very active at tensions 36 to 40. Under a tension slightly above 40 it may disappear. It probably never persists at tensions above 45.

The blood pressure usually varies considerably under a tension of 36 because of the lightly anesthetized state of the animal. Under all increased tensions it remains very regular for that tension. It may remain at about the same level or be successively slightly decreased at each increase of tension until a tension of 43 is reached. It is always greatly decreased by tensions above 48 but usually does not reach zero at tensions less than 50 and rarely persists at a tension of above 55.

In a few experiments the blood pressure slightly increased as the ether tension was increased until 48 to 50 was reached when it decreased very markedly.

The changes in blood pressure under the different tensions of ether depend somewhat upon the initial pressure. When the pressure under 36 is high each increase in tension may produce a definite decrease in the pressure. In the experiments in which the pressure under 36 was low, the first few increases in the ether tension did not always decrease the blood pressure. However, there was always a marked decrease in the pressure when tensions of 48 or 50 were reached.

Not only is the blood pressure not depressed to any great extent by the lower tensions, 36 to 45, but it quickly recovers even after the animal has been etherized for many hours. This is not true for the higher tensions. After an animal has been under a tension between 48 and 55 for an hour or two, blood pressure is greatly depressed and even though ether be withdrawn and air administered until the anesthesia becomes so light that it is necessary to administer more ether, blood pressure only partially



Experiment 399-17. Kymograph record showing the effect of various tensions of ether on depressor and pressor reflexes produced by stimulating the same nerve with different strength and rate of stimuli. There was an interval of one hour between each record. Nerve stimulated: Central end of left vagus. Right vagus sectioned. Stimulus: Primary current derived from storage battery. Depressor response produced with secondary coil at 16, rate 4. Pressor response produced with secondary coil over primary, rate 24 to 30.

	Ether tensions (Approximate)	*Blood pressure reaction*
Record I	36	Decreased from 108 to 92. Increased from 120 to 166.
Record II	43	Decreased from 120 to 94. Increased from 105 to 130.
Record III	44	Decreased from 130 to 108. Increased from 128 to 150.
Record IV	48	Barely perceptible rise. Respiration gone. Increased from 60 to 66.

Note that the depressor reflex and respiration disappeared while the pressor was still active.

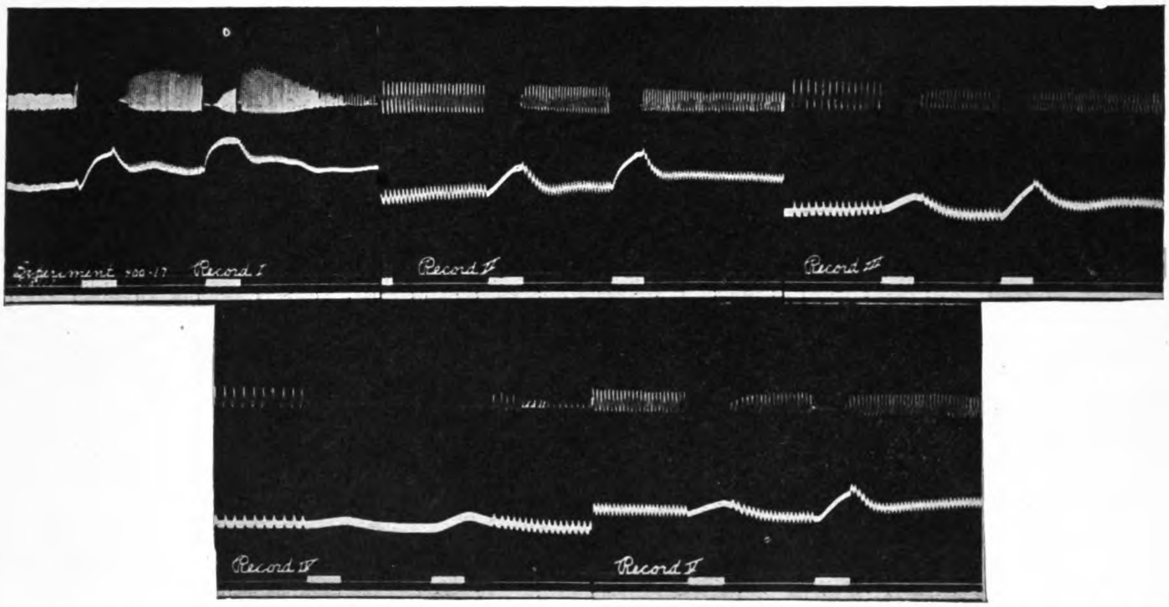
recovers. This result was probably due not only to the anesthetic but also to the long continued low blood pressure.

For the purpose of this study the vascular reflexes may be divided into four groups. The first division is that of pressor and depressor. Stimulation of any mixed nerves will produce these reflexes. When the stimulus is relatively strong and the rate rapid, pressor responses are elicited. When the stimulus is weak and the rate slow depressor reflexes are produced. Each of these reflexes may be divided into two groups, depending upon their path. In a mixed cerebral nerve the number of neurones between the one stimulated and the vasomotor center must be few. In all the other nerves at least for pressor reflexes there are a large number of intermediary neurones. The vagus was taken as the example of a nerve with few intermediary neurones while the sciatic was taken as representative of those having many intermediary neurones. In each instance the nerve was sectioned and the central end stimulated, care being taken to stimulate in the same manner each time.

The pressor vascular reflex produced by stimulation of the central end of the vagus is the easiest of the vascular reflexes to obtain in the dog and for that reason it was studied the most extensively. This reflex is greatest at tensions between 36 and 45. In most instances it is decreased under tensions above 45 although a well-marked rise usually occurs under all tensions up to 48. It is either gone or barely perceptible at a tension of 50 and rarely persists at all above this tension.

Like the blood pressure, it is quite common for the reflex to progressively decrease under each increase of tension until it finally disappears. But this is not constant and in several experiments the reflex might be slightly greater at the higher tension. However, the range of tensions under which it is well marked and the limits at which it disappears are very constant.

The character of the reflex also changes with the change of ether tension. Under the lower tension the rise is not only greater but it is sustained for a greater length of time or a depressor effect takes place immediately after stimulating. As the animal becomes more deeply etherized under the higher tensions the blood pressure does not increase



Experiment 400-17. Kymograph record showing effect of various tensions of ether, on the vascular and respiratory reflexes of the vagi. There was an interval of one hour between each record. Nerves stimulated: Central ends of right and left vagi.

	Ether tensions (approximate)	*Blood pressure reactions*
Record I	36	Increased from 104 to 140 and 122 to 158.
Record II	43	Increased from 94 to 120 and 100 to 132.
Record III	44	Increased from 70 to 86 and 70 to 94.
Record IV	48	Increased from 55 to 60 and 54 to 65.
Record V	36	Increased from 72 to 80 and 70 to 92.

Note that besides a depression of the pressor vascular reflex by the increased tensions of ether there is an increased response to the reflex inhibition of respiration.

so much but quickly returns to its former level upon cessation of the stimulus. After an animal has been under the higher tensions for some time and the anesthetic is then withdrawn until the anesthesia becomes very light, the vascular reflex is usually well marked but not so great as it was initially under a tension of 36.

The pressor vascular reflex produced by stimulation of the central end of the sciatic is depressed by all tensions above 45 and does not appear to persist at tensions above 50. In this respect it is very similar to that of the vagus except that it is more greatly depressed by increased tensions and probably disappears sooner.

Depressor reflexes of either the vagus or the sciatic are quite difficult to obtain in the dog. For this reason the deduction of definite conclusions in regard to the depressor reflex should not be made until comparative data are obtained also in the cat and rabbit in which animals these reflexes are easily elicited. However, in the experiments on the dog in which I was able to obtain depressor reflexes they appeared to parallel quite closely the pressor reflexes in the same nerves under the same ether tension although they sometimes disappeared under a lower tension than the pressor reflex. This was shown best by the depressor reflex produced by stimulating the central end of the vagus.

Blood pressure always persists at either a high tension or for a longer period of time under the same tension than the respiration. The respiration usually fails at a slightly lower tension than the vascular reflexes although in some cases this reflex fails first.

CONCLUSIONS.

These conclusions dealing with the vascular changes under different tensions are based upon experiments performed upon the dog, the Connell apparatus being employed.

1. In general, the physiologic phenomena due to ether are remarkably constant at the same tension in different dogs.
2. The lowest ether tension which will allow operative work is 36.
3. Any tension between 36 and 45 is safe as regards the life of the animal.
4. Any tension between 48 and 60 is liable to prove fatal.
5. Probably no individual dog can survive a tension of 60.
6. The corneal reflex does not persist at tensions above 45.
7. Blood pressure may remain practically the same or be successively slightly decreased at each increase of tension up to 48. It is always greatly decreased by tensions at or above 50. It reaches zero under tensions between 50 and 60.
8. The pressor vascular reflex produced by stimulation of the central end of the vagus is greatest at tensions between 36 and 45. It is decreased under tensions above 45 although a well-marked rise usually occurs under all tensions up to 48. It is either absent or only barely perceptible at a tension of 50 and rarely present at all above this tension.
9. The pressor vascular reflex produced by stimulation of the central end of the sciatic is depressed by all tensions above 45 and does not persist at tensions above 50.
10. The pressor reflex of the sciatic seems to be depressed more greatly by increased tension than that of the vagus.
11. In the instances in which it was possible to study the depressor reflex it appeared to parallel quite closely the pressor reflex in the same nerve under the same tension although it did not persist under quite as high tensions.
12. Respiration usually ceases under a slightly lower tension than the pressor vascular reflex of the vagus disappears although either one may fail slightly before the other.

ABSTRACT OF DISCUSSION.

DR. F. W. NAGLE, Montreal: I have found Dr. Mann's paper exceedingly interesting and valuable. I have noted his same difficulty with the Connell apparatus and in its use during the past year I have utilized pressures of from 50 to 70, the lower pressure providing an efficient anesthesia only for children and very weak patients.

DR. S. J. MELTZER, New York City: While it has been stated that the same tension of ether in all individuals produces the same effects, it must be understood that no matter how accurately an apparatus has been manufactured and adjusted, that animals and individuals vary in their susceptibility to anesthetics, and consequently the biological element in percentage methods of anesthesia remains variable and occasionally disconcerting. The apparatus is reliable enough but the individual remains unstable. Thus tensions and pressures can only be approximated in relation to their usual results.

DR. VAN HOUSEN, Chicago: Dr. Mann's investigations offer a scientific explanation of why ether and chloroform, following scopolamin-morphin narcosis, should never be pushed to the point of abolishing reflexes. I attribute the success of my instruction in the use of this method of combined anesthesia and my experience with it to emphasizing the fundamental principle that in scopolamin-morphin narcosis the reflexes are never abolished and that in supplementing such narcosis for greater relaxation, with chloroform or ether, the reflexes must not be abolished. If the reflexes are obtunded the supplemental anesthetic must be withdrawn until they again become active.

DR. F. C. MANN (Closing): Working with a somewhat inaccurate apparatus makes my conclusions open to question, but I feel justified in holding that within limited range of tensions you get the same phenomena in all individuals. In animal experimentation one can readily sense the variations in response to different tensions, and I am confident it can be established, with a more accurate adjustment of the apparatus, that within a limited range of tension, all animals of a species will respond similarly.

The response in different animals is marked. Thus goats, which are exceedingly difficult to anesthetize on account of hypersecretion of mucous and are prone to anesthetic fatality during experimentation, will run under very much less tension than dogs.

I found also that ether, as near as I can determine, blocks all nerve reflexes except one, provided you give a high enough tension. As the tension of ether is increased the vascular reflexes decrease and a tension is reached under which they do not occur. The pressor reflexes of respiration, those which you wish to excite when you intend to bring the patient back who has been over-anestetized, will also disappear in a majority of cases slightly before respiration ceases. However, there is one reflex which I have never seen blocked in any anesthesia. Any reflex which will inhibit respiratory movements under light anesthesia will continue to do so under any tension until respiration ceases. This will occur even if respiratory movements are only taking place three times a minute. That is in connection with the point that Dr. Muns made this morning in regard to depressor reflexes. Certainly the depressor reflexes disappear slightly quicker than the pressor ones did, and that is more particularly true in regard to respiration. On the other hand, as the anesthetic tension becomes greater, and the animal becomes more under the influence of the anesthetic, the pressor reflex is not obtained. You can stimulate any or all nerves, but it is not obtained and I doubt very much whether respiratory stimulation will produce any beneficial effects on blood-pressure.

References.

1. Boothby, W. M.: Ether Percentages. Jour. Am. Med. Assn., 1913, LXI, 830-834.
2. Connell, K.: An apparatus (Anaesthetometer) for Measuring and Mixing Anesthetics and other Vapors and Gases. Surg., Gynec. and Obst., 1913, XVII, 245-255.
3. Boothby, W. M., and Sandiford, I.: The calibration of the Waller Gas Balance and the Connell Anesthetometer. Jour. Pharm. and Exper. Therap., 1914, V, 369-378.
4. Boothby, W. M.: The Determination of the Anesthetic Tension of Ether Vapor in Man, with some Theoretical Deductions therefrom, as to the Mode of Action of the Common Volatile Anesthetics. Jour. Pharm. and Exper. Therap., 1914, VI, 379-392.

THE EFFECTS OF ETHER ANESTHESIA AND OF VISCERAL TRAUMA AS SHOWN BY VASOMOTOR AND BLOOD-PRESSURE CHANGES. *

Walden E. Muns, M. D.
Columbia, Mo.

These experiments, which have been reported elsewhere[1] were undertaken with a view of determining the actual circulatory changes taking place in the organism during long continued third stage ether anesthesia without other procedures, and also during maintained visceral irritation in the abdomen, the subject being under ether anesthesia.

There are many vexing and moot questions that come up in the consideration of circulatory changes during ether anesthesia. Investigators agree generally that in ether anesthesia there is first a rise in blood pressure corresponding to the first or excitement stage of anesthesia which is followed by a distinct lowering of pressure in long continued third stage anesthesia. Indeed it is a fundamental property of anesthetic substances that they produce the phenomena of excitation before that of depression. Concerning the causes of lowered blood pressure in third stage anesthesia writers do not agree. There are those who maintain that local action of ether on the heart is responsible for the hypostasis, while others see in the phenomena a central as well as a local vasomotor effect.

The condition of the peripheral arteries during third stage ether anesthesia also provokes disagreement. While most all writers agree that the smaller arteries and capillaries are dilated, the opinions diverge on the cause of the action. Some claim a central medullary depression with peripheral paralysis, while others see a direct local dilatation.

Visceral irritation such as experimental intestinal trauma or ordinary surgical operations under ether anesthesia is accompanied by certain circulatory changes. All workers, of course, agree on the pure observable phenomena. While a low blood pressure in shock is a common observation, the theories as to its cause are quite divergent and have caused a great deal of discussion. Against those who proclaim exhaustion and paralysis of the vasomotor center as the cause are those who maintain that other factors are at work.

Inseparable from the subject of blood pressure in shock, is the question of the condition of the peripheral arteries. The greatest disagreement exists between observers as to whether the smaller arteries and arterioles are dilated or contracted in shock. Whether they are contracted or dilated there seems at present to be no chance of agreement as to the reasons for either phenomenon.

While it is impossible to answer all of these questions by deductions from a relatively few graphic experiments, it may be possible to at least set at rest a few doubts as to the purely observable phenomena in connection with the circulatory system.

It is proposed therefore to graphically demonstrate the actual changes in the blood pressure, and in the vasomotor reactions during ether anesthesia, and those variations accompanying visceral trauma under ether. Such experiments may show the definite relations existing between the blood pressure and the vasomotor status, and also the relationship between the depression and the mechanical stimulation of the visceral manipulations. The question naturally arises as to what depressing, exciting, or neutralizing effect the anesthetic may have on the vasomotor mechanism in surgical manipulation of viscera.

Dogs weighing 6 kg. to 12 kg. were used. The ether was administered by intratracheal tube through an ordinary breathing bottle in half the cases, and

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by continuous insufflation in the other half. The blood pressure was taken from the carotid and recorded through a mercury manometer. One hind leg of the dog was placed in a plethysmograph of large size; the apparatus was then connected with a recording water manometer and the whole system filled with water. Every change in volume of the leg denoted a variation of the peripheral vasomotor mechanism within the leg.

In one series of experiments many dogs were caused to remain under ether for long periods of time, records being graphed every half hour. The shortest experiment was one hour in length and several experiments lasted six hours and over. In several cases there was a slight fall of blood pressure after the first half hour. In one-half of these cases the fall in pressure continued to death, and in the other half there was a slight gradual rise to death. In those cases showing rapid fall of blood pressure, the animals died in a short time. The dogs that showed a gradual rise of pressure remained alive six hours and over. In five to forty minutes after the beginning of the experiment, a change in leg volume was noted. Several cases showed a vasodilatation and several showed a vasoconstriction. At the end of the first half hour there was a general vasodilatation shown in all cases but one. At the end of the first hour (the second hour of anesthesia), all cases showed a marked vasodilatation, which condition slowly increased, with occasional periods of vasomotor recovery, until at death there was a total increase of leg volume of 2 cc. to 18 cc.

The normal tone and resistance in the arteries were altogether or partly destroyed in all cases, and the blood pressure lowering effect of this one factor, obtaining throughout all the periphery, must have been tremendous. Why, then, was there in half the cases a decided and fatal fall in blood pressure, and in the other half a decided maintenance of the tension? It is evident that the question must be answered by considering the normal compensatory reaction of the heart to the blood pressure lowering tendency of the peripheral dilitation. While the heart did not increase in rate in any instance, there was a decided increase of ventricular output, an increase great enough to overcome the hypostatic effect of the peripheral dilation: the blood pressure was maintained and even raised a little. It is evident that if the heart fails to show this compensatory reaction, because of organic disease, or too early response of the nervous centre to the effect of the anesthetic, the blood pressure must fall, as it did in the three cases noted.

In considering the cases showing the failure of the circulation, it is permissible to argue that any means of preventing or overcoming the peripheral vasodilatation would have helped to maintain the blood pressure.

In summing up the results of these anesthetics we may say that (1) ordinary third stage ether anesthesia prolonged beyond one hour results in marked vasodilatation of peripheral vessels; (2) that there is a direct relationship between the condition of the vasomotor control and the blood pressure; and (3) that the end result of ether depression is loss of vasomotor function and death.

In another series of experiments the dogs were anesthetised after which the whole small intestine was delivered through an incision in the linea alba. The intestine was then kneaded and rolled between the hands or in a towel constantly for varying lengths of time, deep anesthesia being maintained. The experiments lasted from 45 minutes to 165 minutes after adjustment of the apparatus. The deep anesthesia and the violent trauma brought on death quickly. In all cases but two the blood pressure was maintained throughout the experiment, or at the end was higher than at the beginning. It was only at the very last minute of life that the loss of vasomotor function occurred and the blood pressure fell rapidly to death. In all cases but one, there was a definite vasoconstriction of peripheral arteries which resulted in a fall of leg volume of 2 cc. to 10 cc. This change in the peripheral vessels began almost immediately the intestines were disturbed and continued as long as the stimulation was applied.

The vasoconstriction in the peripheral vessels seemed to be an important factor in maintaining the blood pressure in cases of gradually developing collapse from ether depression, as it may be in cases of lowered blood pressure from splanchnic dilatation in traumatic shock. Whenever the intestinal irritation was not accompanied by vasoconstriction of the peripheral vessels, the blood pressure tended towards a fall, through the vasomotor depressent effect of the ether. Whenever the vasoconstriction was present *but slightly,* the blood pressure showed itself to be better maintained, the depressor and pressor agents offsetting each other. When the vasoconstriction was marked, the tendency towards the maintainance of the general blood pressure was greater. In some cases there was an actual rise of blood pressure due to the domination of the pressor over the depressor effect.

In summing up the results of these intestinal trauma experiments we may say that (1) manipulation of the intestines brings about a vasoconstriction; (2) that there is a relationship between this vasoconstriction and the blood pressure.

In the light of what we have learned from these and other experiments, it may be said that an anesthetic substance such as ether and an irritation to abdominal viscera such as intestinal handling, produce two different kinds of stimuli. The anesthetic substance first excites and then depresses. The depression is its essential and marked effect and if too prolonged it results in total functional incapacity. The effect of visceral irritation is wholly excitatory, being mechanical. When this irritation becomes too severe or is continued too long the summated excitant stimuli leads to over-activity and fatigue, and the end of fatigue is exhaustion.[2] Then both the anesthetic and the visceral injuries may lead to absolute conditions, either complete depression or complete exhaustion. But, though the end result is reached by entirely different processes, the effect is identical in a complete functional incapacity. An exhausted function is just as incapacitated as a depressed function.

In the ordinary major operation with ether as the anesthetic, a moderate amount of excitation from handling is a helpful factor. There can be no question that there are occasions, when the patient is on the verge of syncope from ether depression, when a vigorous cutaneous or visceral irritation would restore the vasamotor tonus, resulting in a beneficial reflex rise in pressure. There are many experiments that show the sensitiveness of the vasomotor mechanism to reflex stimulation, and it is clear how such a reflex stimulation in proper time and moderation may very well become a remedial measure in impending ether death. There are a few reported cases where the sudden cessation of manipulation of the peritoneum during laparotomies resulted in arrest of heart and respiration. In such cases a certain amount of irritation was balancing a certain amount of anesthesia, and when the irritation was suddenly removed, the anesthesia slid into the danger phase. When sensory stimuli and the anesthetic are exhibited together there is one period when the excitation from the surgical technic and the depression from the drug are pitted against each other to the good of the patient. Either may be better borne in the presence of the other.

If the anesthetic and its neutralizing irritation be continued too long or are of undue severity, the two antagonists become allies in effect and bring about a much quicker collapse from functional incapacity than had only one agent been at work. It is suggested therefore, that the symtom complex known as post operative shock is a combination of the effects of excitation and depression and varies directly with these two factors.

If these deductions form the true explanation of the relationship and sequence of events in ordinary surgical operation that go on to post operative shock, the present day ideas of prevention and treatment of such conditions must be altered. If one can accept the fact that ether anesthesia and visceral trauma may each in itself cause functional incapacity, and that when applied together they may act quicker and surer than when used alone, there can be no crimination as of surgeon against anesthetist, or as of anesthetist against surgeon in case of accidents. If the prevention of post operative shock depends upon a proper balance between the two types of stimuli, then both surgeon and anesthetist should quite properly understand such relationship, and so govern the administration of the two types of stimuli that they will not be too severe, too long continued, or too out of balance. The importance of this idea is being more and more recognized.

If functional incapacity may be brought about through the excessive application of either type of stimulus, or still easier by the use of both types together, the treatment of post operative shock must be based on the proper designation of the predominating etiological factor. It is obvious that remedial measures designed to counteract a condition brought on by too much ether might not be exactly suited to cure traumatic or sensory shock. Although both conditions are expressed outwardly in the one common way the body mechanism can display them, the absolute condition is reached by entirely different processes.

BIBLIOGRAPHY.

[1] Proc. Soc. Exper. Biol. & Med., 1915, xii, 87-90. Journal Missouri State Medical Associations, 1915, xii, 482; and Annals of Surgery December, 1916.

[2] Dolley, D. H.: The Cytologic Analysis of Shock. Jour. Medical Research, 1916, xxxiv.

CONCERNING THE EFFECTS OF ANESTHESIA ON THE BLOOD VOLUME AND ITS RELATION TO THE PRODUCTION OF SHOCK.*

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The subject of traumatic surgical shock has been amply studied by many investigators, and the mechanism which gives rise to its clinical manifestation is now fairly well understood. But in the experimental and clinical observation of this syndrome, we find little evidence of the part played by the anesthetic in its causation.

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Shock is essentially a condition of depressed vitality induced by the disturbances of circulation of such a nature that the quantity of blood which reaches the heart is insufficient for the maintenance of life. The ultimate cause of the disturbance is prolonged or excessive irritation of the central nervous system.

In view of the fact that shock has its origin in nerve irritation, the service of an anesthetic in any operative procedure would be primarily to obviate or lessen the tendency to its development; for as we know, anesthesia blocks the afferent nerve paths. However, Henderson[1] in his masterful dissertation on the subject, demonstrates how an anesthesia, when unskillfully given, may not only fail to abolish the tendency to shock, but may render the nerve centers so highly sensitive as to be directly responsible for the production of shock.

Be that as it may, most authors now recognize that the most striking pathological feature of shock is the reduction of the total quantity of blood in the body. Not only is the bulk of the blood in the venous system, but the whole volume of blood is very much diminished. It is for this reason that the clinical effects of shock have so often been likened to those of severe hemorrhage; and it is admitted that the two conditions, shock and hemorrhage, may be clinically indistinguishable. My object in touching upon these points is to bring into relation the chief factors concerned in the production of shock, with some of the striking effects of anesthesia; for anesthesia, as I will presently show, does of itself cause a prompt and considerable reduction in the blood volume.

While pursuing some work on the blood sugar changes in experimental diabetes[2] I have had occasion to observe that variations in the blood volume occur even in that brief period of anesthesia which precedes the actual operation. These changes were so constant and so striking, that subsequently in studying the effect of surgical procedures upon the blood sugar[3] I was forced to the conclusion that the hyperglycemia observed under these conditions was to some extent due to a concentration of the blood, caused by the reduction of the blood volume.

The present communication is based on animal experiments, and observations were made on some forty-one cats. A large number of the animals were studied purely for the effects of the anesthesia on the blood volume, and were permitted to recover without submitting them to surgical manipulations. Others were operated on for various purposes, and determinations of the blood volume were made at different stages of the operations. This afforded an opportunity to observe blood volume changes which occur as a result of the anesthesia alone, and those incidental to the exposure and manipulation of different abdominal organs.

The changes in the blood volume were estimated by means of the method which I have described in the Journal of Laboratory and Clinical Medicine, May, 1916[4]. This method assumes, correctly, I believe, that the total quantity of cells in the blood in one and the same individual does not vary appreciably within short periods of time; and the computation is based on the principle that a change in the relation between the fluid portion and the cell content of the blood is an indication of the change in the total blood volume. In other words, if at the beginning of an experiment the blood shows that the cells occupy 50 per cent of the total volume in a unit of blood, and one-half an hour later, from one cause or another, the cell content rises to 55 per cent of the volume, the blood has undergone concentration. The extent to which the volume of blood has become reduced under such conditions is equal to $50/55=90$ per cent. Conversely, if the blood cells are found in the second examination to be only 45 per cent., the blood has become diluted, and the increase in the blood volume which can cause such dilution is $50/45=110$ per cent.; so that in the first instance we have a reduction in the blood volume from 100 to 90 per cent. of the original volume; in the other we have an increase in the blood volume from 100 to 110 per cent.

Thus, without attempting to establish the exact volume of blood that is in circulation in each individual case, we can by these simple means determine the exact degree of variation that it may undergo from different influences.

By speaking of concentration of the blood, I mean concentration of the whole blood, and not merely that of the serum or plasma. Concentration or dilution of the serum or plasma may occur as a result of addition or abstraction of soluble solids, without there being any change in blood volume. This distinction is important, because reports based on changes in concentration of the blood serum do not furnish conclusive evidence that the blood volume has been altered thereby. Even changes in viscosity of the blood may lead to incomplete or erroneous interpretation. Thus Burton-Opitz[5] observes that alcohol inhalation raises the viscosity and increases the specific gravity of the blood, and attributes these changes

TABLE I.

Susceptible Animals—Operated—Ether Anesthesia.

Cat No.	Date and Hour.	Per Cent. Plasma Volume.	Per Cent. Cell Volume.	Per Cent. Relative Blood Volume.	Remarks:
5	Oct. 10, 1914				Normal Cat.
	9.43 P.M.	63.5	36.5	100.0	Before anesthesia.
	10.23 P.M.	59.1	40.9	89.2	End of operation for nephrectomy.
		63.9	36.1	101.1	Next morning.
12	Nov. 3, 1913				Normal Cat.
	4.15 P.M.	64.6	35.4	100.0	Before anesthesia.
	5.45 P.M.	57.0	43.0	82.3	End of operation for nephrectomy and pancreatectomy.
20	Dec. 19, 1914				Fasted Cat.
	4.10 P.M.	62.0	38.0	100.0	Before anesthesia.
	4.20 P.M.	58.0	42.0	90.0	During operation.
	4.45 P.M.	56.7	43.3	87.0	End of operation for pancreatectomy and nephrectomy.
	11.00 P.M.	65.2	34.8	108.0	
21	Dec. 19, 1914				Fasted Cat.
	4.55 P.M.	60.9	39.1	100.0	Before anesthesia.
	5.25 P.M.	50.0	50.0	78.2	End of operation for pancreatectomy and nephrectomy.
		64.0	36.0	108.6	16 hours later.
23	Jan. 8, 1915				Fasted Cat.
	2.40 P.M.	57.5	42.5	100.0	Before anesthesia.
	2.55 P.M.	53.0	47.0	90.4	During operation.
	4.10 P.M.	54.2	45.8	93.0	End of operation for pancreatectomy and nephrectomy.
	10.45 P.M.	59.2	40.8	104.0	6½ hours later.
24	Jan. 8, 1915				Normal Cat.
	4.25 P.M.	46.1	53.9	100.0	Before anesthesia.
	5.00 P.M.	43.8	56.2	95.0	End of operation for nephrectomy.
	10.55 P.M.	44.4	55.6	97.0	5 hours later.
	12.30 A.M.	46.1	53.9	100.0	8 hours later.
25	Jan. 9, 1915.				Fasted Cat.
	8.15 P.M.	48.7	51.3	100.0	Before operation.
	9.45 P.M.	39.5	60.5	84.0	End of operation for pancreatectomy and nephrectomy.
		51.0	49.0	104.7	Next morning.
26	Jan. 9, 1915.				Fasted Cat.
	9.55 P.M.	61.4	38.6	100.0	Before anesthesia.
	10.20 P.M.	57.0	43.0	89.8	End of operation for nephrectomy.
		61.7	38.3	100.8	Next morning.
29	Jan 25, 1915.				Normal Cat.
	8.05 P.M.	48.2	51.8	100.0	Before anesthesia.
	8.42 P.M.	43.3	56.7	91.4	End of operation for nephrectomy.
		48.4	51.6	100.5	Next day.
31	Apr. 19, 1915.				Fasted Cat.
	8.40 P.M.	55.2	44.8	100.0	Before anesthesia.
	9.40 P.M.	48.6	51.4	81.0	End of operation for pancreatectomy.
		54.1	45.9	97.9	Next morning.
40	Mar. 9, 1917.				Normal Cat.
	1.30 P.M.	57.0	43.0	100.0	Before anesthesia.
	1.45 P.M.	51.2	48.8	88.1	Abdominal incision.

to an accumulation of excretory material in the blood. Whereas this may be true on the basis of the results obtained, another conclusion is admissible,—namely, that the inhalation of alcohol causes a passage of water out of the blood into the tissues. This may cause an increase in the concentration of the serum, and also reduce the whole blood volume.

Sherrington and Copeman[6] have found that in traumatic shock the specific gravity of the blood is markedly increased, and Yandel Henderson[7] interprets these findings as evidence of a decrease in the blood volume.

Changes in the cell count or in the hemoglobin content of the blood may be regarded as better evidence of volumetric variations of the blood than changes in viscosity or specific gravity; and although these methods have been used in the study of such problems in different experimental investigations, they have not been applied to the study of blood volume in shock. Hence, the validity of the conclusions concerning the reduction of blood volume in shock might be questioned; although most authors agree that in shock the blood volume is very much reduced. Important proof that a state of

TABLE II.

Ether Anesthesia—Susceptible Animal—No Operation.

Cat No.		Per Cent. Plasma Volume.	Per Cent. Cell Volume.	Per Cent. Relative Blood Volume.	Remarks:
38	Before anesthesia	58.0	42.0	100.0	
	8 minutes later	55.0	45.0	93.3	lightly under
	21 minutes later	54.3	45.7	91.9	deeply under
	29 minutes later	58.0	42.0	100.0	reacting
	32 minutes later	60.0	40.0	105.0	no anesthesia
	36 minutes later	60.1	39.9	105.0	no anesthesia
	40 minutes later	57.4	42.6	98.6	lightly under
	47 minutes later	55.3	44.7	94.0	deeply under

This protocol shows that in the susceptible animal the blood volume becomes reduced when narcosis is induced, and again returns to normal and even increases temporarily when the anesthesia is stopped. Re-administration of the anesthesia causes again a fall in bood volume.

TABLE III.

Refractory Animals—Operated—Ether Anesthesia.

Cat No.	Date and Hour.	Per Cent. Plasma Volume.	Per Cent. Cell Volume.	Per Cent. Relative Blood Volume.	Remarks:
6	Oct. 13, 1914				Normal Cat
	8.30 P.M.	68.1	31.9	100.0	Before anesthesia
6	9.10 P.M.	70.4	29.6	102.9	End of operation for nephrectomy
8	Oct. 22, 1914				Normal Cat
	9.10 P.M.	57.9	42.1	100.0	Before anesthesia
	9.50 P.M.	60.0	40.0	105.0	End of operation for nephrectomy
32	Apr. 19, 1915				Fasted Cat
	9.45 P.M.	56.3	43.7	100.0	Before anesthesia
	10.30 P.M.	58.1	41.9	104.3	End of operation for pancreatectomy

TABLE IV.

Ether Anesthesia—Refractory Animal—No Operation.

Cat No.	Duration of anesthesia.	Per Cent. Plasma Volume.	Per Cent. Cell Volume.	Per Cent. Relative Blood Volume.	Remarks:
39	Before anesthesia	60.7	39.3	100.0	
	8 minutes later	59.9	40.1	98.0	lightly anesthetized.
	16 minutes later	62.1	37.9	104.0	incompletely anesthetized
	27 minutes later	61.4	38.6	102.0	incompletely anesthetized
	32 minutes later	60.0	40.0	98.2	incompletely anesthetized
	37 minutes later	58.0	42.0	93.0	fairly deep anesthesia
	38 minutes later	61.5	38.5	101.0	anesthesia stopped.
	45 minutes later	62.5	37.5	104.8	reacting

This protocol shows that while the animal was refractory no marked change in the blood volume occurred. During the short period of deep anesthesia, however, its blood volume did become considerably diminished.

TABLE V.

Cat No.	Source of Blood.	Per Cent. Plasma Volume.	Per Cent. Cell Volume.	Remarks:
27	Ear Vein	45.9	54.1	Animal under ether anesthesia.
	Gastric Vein	45.6	54.4	Results show the uniform distribution of cells and plasma in different parts of the circulation.
	Portal Vein	45.9	54.1	
	R't Aurice	45.8	54.2	
28	Ear Vein	42.9	57.1	Animal under ether anesthesia.
	Portal Vein	42.2	57.7	Results similar to those obtained in above experiment.
	R't Aurice	40.8	59.2	

oligemia or reduced blood volume exists in shock is furnished by the work of Mann.[8] From the experiments which he performed this observer draws the conclusion that the clinical signs of shock are due to a loss of circulatory fluid.

To summarize then, it is generally agreed that the most striking change in the blood in the course of shock is the diminution of its volume. This is not regarded as an effect of shock, but rather as one of the potent factors concerned in its development. Nor does this mean that *"the bulk of the blood is transferred from the arterial to the venous system."* It means that the blood content of the entire circulatory system is diminished, not as a result of a change of distribution, or a loss by hemorrhage.

The reduction in blood volume is brought about by a passage of fluid from the blood to the tissues. The mechanism of this may be twofold in character. It may be, as Malcolm[9] believes, due to the spastic state of the smaller arteries and the engorgement of the venous trunks, which leads to a transudation of serum; or as Henderson[10] believes, it may be due to an altered state of the tissues brought about by an acute *acapnia,* or reduced carbondioxid content of the blood, which causes an increased imbibition of fluid by the tissues.

In the experiments which I have performed, two anesthetics, ether and chloroform, were used. Inasmuch as ether is the anesthetic of choice, both in clinical and experimental work, the larger number of observations were made with this drug. In the present communication the discussion will therefore be devoted to the effects of ether. The results obtained may be divided into two distinct groups: (1) Those obtained on animals which yielded readily to the anesthetic. (2) Those obtained on animals which proved refractory to the action of the anesthetic. The majority of animals tested reacted normally to the ether. In this group, Table I, and II, the blood volume is promptly affected by the anesthesia. As may be observed, the blood volume becomes reduced, and then gradually returns to normal, as the effect of the anesthesia wears off. In the second group—that is in animals which can not be rendered deeply anesthetic, the changes in blood volume are insignificant as shown in Tables III and IV.

In order to determine whether the blood volume changes bear any definite relation to the susceptibility of the animals to the anesthetic, several tests were made on cats which were at first anesthetized deeply, allowed to recover, and again rendered deeply anesthetic. The results obtained in this set of tests are exemplified by one of the protocols in Table II. These results proved that animals which respond readily to the action of the anesthetic, show a prompt reaction in the blood volume.

The question might naturally arise, whether the changes in the cell content of the blood (upon which the computation of the blood volume depends) observed after the administration of anesthesia, might not be due to an uneven distribution of the cells in the blood. It might be argued that as a result of the change in the tone of the blood vessels (spasm of the smaller arteries) the velocity of the blood might be delayed, and in consequence, circulation of the cellular elements may be impeded. This could give rise to a greater cell concentration in the blood in some parts of the circulation than in others.

To determine this point, the following experiment was performed: A specimen of blood was obtained from the ear-vein of a cat, and the cell content determined according to the method described. The animal was then thoroughly anesthetized, and another specimen of blood was obtained at the same point. Directly thereafter, a long incision was made in the abdomen, all of the viscera exposed, and specimens of blood obtained from different localities; and finally, by rapid exposure of the thoracic viscera, a blood specimen was also obtained from the heart. All the specimens were examined for the blood cell content, and the results derived, as shown by the protocol in Table V, indicate that the distribution of the cells throughout the circulation is uniform. In other words, the blood is not any more concentrated in one part of the vascular system than in another, under these conditions.

The mechanism which underlies the reduction in the blood volume during narcosis has not been determined in this study. Increased salivary secretion and sweating may be partly responsible for the loss of some fluid from the blood. Boothby and Berry,[11] have demonstrated that muscular work accompanied by sweating is associated with a marked concentration of the blood. That loss of fluid through these channels plays any very great part in the causation of the blood volume reduction seems unlikely from the fact that the animals which are refractory to anesthesia salivate very profusely, and behave in all other respects like the normal animals, but do not show any change in blood volume.

It seems probable that abstraction of fluid by the tissues from the blood plays the major part in the production of the phenomenon observed. This gains support from other associated conditions which are known to develop in anesthesia. It is now well known[12] that an acidosis develops during narcosis. It is also known that the lipoid content of the blood is increased during anesthesia. This latter phenomenon is ascribed to a mobilization of the substances from the tissues. From the work of Overton and Meyer,[13] we know that the potency of an anesthetic agent depends upon its power to dissolve fatty and lipoid material, by virtue of which action it can penetrate tissue cells. It would therefore seem that the acidosis and the mobilization of lipoids favor development of a condition in the tissues which renders them partly hydrophilic—that is, capable of absorbing fluid. The work of Herlizka,[14] and that of Koch and Voegtlin,[15] offers additional support to this view. Whether or not an *acapnia,* as Henderson[16] suggests, plays a part in this process, can not be determined from the observations which I have made. According to this view, the animals which proved refractory to the anesthetic should have been particular predisposed to showing changes in blood volume. The fact that they fail to show any such variation seems to offer a divergence from the view that *acapnia* plays the rôle ascribed to it.

CONCLUSIONS.

This study furnishes data concerning the effect of anesthesia on the blood volume. In susceptible animals the blood volume is reduced in considerable quantity and very promptly. The difference in respect to the blood volume observed in animals which were anesthetized (and not operated) and those which were subsequently operated on, is one of degrees; for the extent of the reduction of the blood volume in the operated animals is somewhat greater than in the others. This difference can not be ascribed to a difference in duration of anesthesia, because the change in the blood volume is usually a very prompt one, and prolongation of the anesthesia seems to have little effect upon the phenomenon. On the other hand, recovery from the anesthesia is accompanied by a return of the blood volume to the normal.

In view of the fact that one of the most striking changes in shock is the reduction of blood volume, attention is therefore called to the effect of anesthesia on the blood, because it may initiate the very changes that are acknowledged to be such constant accompaniments of shock.

BIBLIOGRAPHY.

1. Henderson, Yandel; 17th Int. Cong. Med., London. 1913; Sub. & Section vii (b) Discussion 3, 49.
2. Epstein, Albert A., & Baehr, George; J. Biol. Chem. 1916; xxiv, 1.
3. Epstein. Albert A., & Aschner, Paul; J. Biol. Chem. 1916; xxv, 151.
4. Epstein, Albert A., J. Lab. & Clin. Med. 1916; i. 610.
5. Burton-Opitz, R.; Am. J. Phys. 1894; xxxv, 265.
6. Sherrington & Copeman; J. Phys. 1893; xiv, 52.
7. Henderson, Yandel; Am. J. Phys. 1910-11; xxvii, 164.
8. Mann, Frank C.; J. Gynec. & Obst. 1915; xxi, 430.
9. Malcolm, John D.; Trans. Med. Soc., London, 1909; xxxii, 274.
10. Henderson, Yandel; Am. J. Phys., 1910-11; xxvii, 161.
11. Boothby, W. M., & Berry, F. B.; Am. J. Phys., 1915; xxxvii, 378.
12. Morriss, Wm. H.; J. Am. Med. Ass., 1917; lxviii, 1391.
13. Overton & Meyer, H.; Handbuch d Path. & Pharmak, von R. Heniz, 1904, i part 1. 73.
14. Herlizka; Arch. Fisiol., 1909; xvi, 369.
15. Koch, M. & Voegtlin, C.; Bull. Hygienic Lab. 1916; No. 103, 129.
16. Henderson, Yandel; l. c. 17th Int. Cong. Med., Lon, 1913; Sub. & Section vii (b) Discussion 3, 49.

COMPARATIVE STUDY OF BLOOD PRESSURE IN ANESTHESIA.*

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A scientific view of anesthesia favors the administration of measured doses of the anesthetic agents and careful observation of the effects which result. With this view in mind, we note the amount of the drug used for producing local, spinal, or general anesthesia and the resulting change in the body functions. In this connection a study of the blood pressure is both interesting and profitable.

METHODS OF ANESTHESIA EMPLOYED.

We have administered nitrous oxid-oxygen with the intermittent flow apparatus of McKesson, which furnishes a dosage measured in percentage of the gases, with a measured percentage of rebreathing, or the constant flow apparatus of the author, which measures the flow of each gas in liters per minute.

Our method of etherization provides a constantly measured dosage of liquid ether with a constant proportion of waste. With this method the depth of anesthesia is at all times under perfect control, and a much lighter degree of anesthesia is possible than can be accomplished by the most expert anesthetist using a less exact method. This manner of measuring ether dosage has obvious practical advantages over the estimation of percentages of ether vapor by weight or by volume, or the expression of partial pressure in terms of a column of mercury. It is not affected by the confusion which exists among vapor percentages by weight and by volume and, to a greater degree, concerning vapor tension. Since there is no instrument for directly measuring vapor tension, the expression of dosage in terms of such tension is of some inetrest, but of little practical value.

THE BLOOD PRESSURE APPARATUS.

As the blood pressure apparatus for use during anesthesia is not standardized, a description of the form which we have found most practicable will be of interest. An aneroid manometer, connected by rubber tubing to a rubber cautery bulb and to the usual five by nine rubber arm band with inelastic cover, is conveniently attached by a safety-pin to the patient's pillow. The cautery bulb has practical advantages over the metallic pump used for the same purpose. It is provided with a needle valve for reducing the pressure in the cuff. The arm band is wrapped closely about the patient's arm and the outer folds secured with a safety-pin. The tube connecting the cuff with the manometer is two and a half feet long.

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* Read during the Fifth Annual Meeting of the American Association of Anesthetists, New York City, June 2, 1917.

A flat stethoscope bell is secured over the brachial bifurcation at the elbow by an arm elastic. If a Bowles stethoscope is used, the rubber disc is replaced by the diaphragm from a telephone receiver, as the porous rubber disc absorbs moisture from the skin and becomes inefficient during the course of a long operation. The stethoscope bell is connected to suitable ear pieces by three feet of rubber tubing. This apparatus is put in place before the anesthesia is commenced. The anesthetist, sitting at the head of the table, is able to take the systolic and diastolic pressures as frequently as desired without inconveniencing the surgeon or himself. Between observations the pressure in the cuff is completely released by the needle valve.

The apparatus in constant use will suffer many hard knocks and the accuracy of the dial should be frequently tested by comparison with a standard mercurial manometer. The blood pressure record, with the record of anesthetic dosage and other observations are recorded in figures on a chart, this method being more efficient than the use of a graphic chart.

Anesthetic Dosage.

While using a method resulting in a constant proportion of waste, the dosage of inhalation anesthetics can be stated as exactly as the dosage of other potent drugs. The dosage does not vary proportionally with age, body weight, or variations in the blood pressure. There is no foundation for the general supposition that anesthetic dosage is modified by previous anesthesia or by changes in the position. As in the case of other drugs, occasional instances of susceptibility to and immunity from the effects of general anesthetics are encountered, the dosage in these cases varying from as much as twice to as little as one-fourth the usual dosage. The dosage required to maintain a definite degree of anesthesia increases in proportion to the severity of the operative trauma.

Dosage in Case of Shock.

In the presence of surgical shock, the required dosage of an anesthetic is greatly diminished. It might be supposed that this diminution in dose might be due to the fall in blood pressure. A reduction in pressure in the alveolar capillaries might explain the increased potency of a constant intra-alveolar percentage of ether vapor, but as anesthetic dosage bears no fixed relation to blood pressure under other conditions, the diminished required dosage in shock probably does not depend upon lowered blood pressure.

Observations Before and During Operations.

Blood pressure observations are of value as an index to the patient's condition during the operation and also in the preliminary examination. In interpreting the preliminary observation it is important to remember that a rise of as much as 50 mm. in the systolic and pulse pressures without much change in the diastolic pressure may be due to mental excitement. This change may be encountered either at the preliminary examination or during the early stages of the anesthesia. A considerable rise in blood pressure occurs in those cases in which cyanosis is allowed to develop in the course of anesthesia. Retching or vomiting causes an immediate rise of 10 to 30 mm.

Effect of Position.

The systolic pressure increases in the lithotomy position. It is not markedly modified in the Trendelenburg position, but in those cases where the systolic pressure has been depressed in the reverse Trendelenburg position, it is immediately raised by a change to the Trendelenburg position. To watch the blood pressure during an abdominal operation on a subject in the reverse Trendelenburg position is an experience attended with the greatest interest. The steady decline in pressure corresponding to the accumulation of the blood from the peripheral circulation in the great abdominal blood reservoir, followed by the rapid rise when the position is shifted to the Trendelenburg, affords a graphic demonstration of the peripheral theory of shock.

Shock and Blood Pressure.

Patients who are skilfully anesthetized with gas-oxygen or with ether often show no great change in blood pressure even during severe operations. We have noted many cases where operations as severe as abdominal hysterectomy, salpingo-oophorectomy, or cholecystectomy, perhaps with considerable manipulation of the intestines and the introduction of gauze packing, have been done under the usual dosage of the anesthetic without a change in the systolic or diastolic pressure at any time more than 10 mm. Frequently, however, under the usual dosage, traction on the uterus or gall bladder, manipulation of the intestine, introduction of gauze packing, removal of the prostate gland, or opening the urinary bladder and the application of heat to large, denuded areas, as in breast amputations, is followed by a sharp but usually transient fall in blood pressure. When a large dose of the anesthetic is administered because of an idiosyncracy of the patient, the same condition holds true, but when a large dose is required to maintain anesthesia because of the severity of the operative trauma, a serious decline in blood pressure invariably follows.

The greatest practical value of blood pressure observations in anesthesia is in the detection of shock. Porter states that when the diastolic pressure remains for some time at from 45 to 50 mm., it will probably not recover without aid. A diastolic pressure of 50 mm. is therefore critical.

McKesson's rule is of the greatest practical value. He states that a typical case of shock is characterized by a diastolic pressure of 60 mm. or less, a pulse pressure of 20 and a pulse rate above 120. If this state is allowed to continue for half an hour the patient will not recover.

The anesthetist who is a student of blood pressure and keeps this rule in mind will rarely, if ever, record a death from surgical shock.

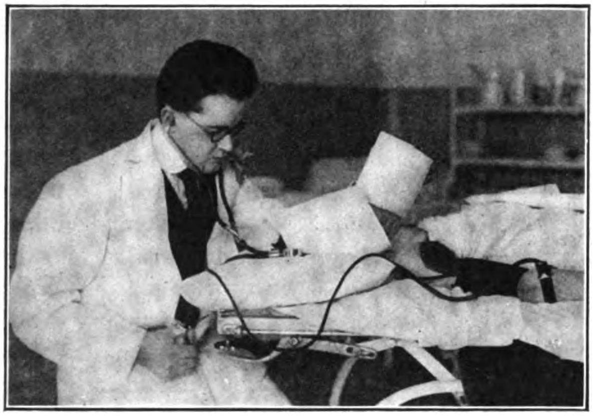

Fig. 1. Method of taking blood pressure during anesthesia.

Presence of Abdominal Tumors.

Patients with large abdominal tumors regularly present a high blood pressure, which falls rapidly on delivery of the tumor or exacuation of its contents. If, in such cases, there is some dyspnea present, a marked variation in the systolic and pulse pressures is noted during the respiratory cycle, the systolic pressure in some cases mounting 30 mm. higher in each expiration than during inspiration.

Other Anesthetics.

In the case of chloroform, Fairlie, whose observations are corroborated by Mummery, claims that the fall in blood pressure in the presence of shock is greater than under ether, but that recovery is more rapid after chloroform anesthesia.

Serious operations under local anesthesia are regularly attended with wide but transient variations in both systolic and diastolic pressure.

Spinal anesthesia is attended with a fall in systolic and diastolic pressure which is sometimes of desperate proportions.

131 Waterman St.

Abstract of Discussion of the Papers of Drs. Miller, Epstein and Muns.

Dr. S. J. Meltzer, New York City: The subject of shock is of perennial interest and yet its definition is yet to be scientifically established and its treatment clinically perfected. Undoubtedly there is something in Henderson's contention that acapnia produces shock and that rebreathing is a cure. But in the discussion of Henderson's original paper, all the physiologists did not accept his view, and I raised the point as to whether the decreased carbon dioxid content caused shock or the shock caused the decreased output of carbon dioxid. Similarly with regard to Dr. Epstein's paper, which really should be studied before being discussed, it would be difficult to determine whether loss of blood volume caused shock or shock caused the decreased blood volume.

With regard to recovery following low blood pressures, systolic or diastolic, in experiments on animals, I have found that irrespective of pressures as low as 20 systolic, if respiration could be maintained, all animals recovered. Life is, after all, dependent on the integrity of respiration and circulation, but the latter will withstand more variation than the former, and in this connection it must always be remembered that ether paralyzes the peripheral nerve centers and respiration is much less than normal during anesthesia. Animals will recover from 6, 8 or even 36 hours of anesthesia if respiration is sufficiently maintained. The control of the one factor so important to life assists in controlling the other.

Dr. James T. Gwathmey, New York City: Anesthetists are generally familiar with the picture of shock—the profound relaxation, the opened eye-lids, the dilated pupil, the rapid pulse, the feeble respirations, the pallid, cold, clammy skin. Patients should never come to this crisis. In the prophylaxis of shock, in working with one of the New York surgeons, it has been our custom to use saline hypodermoclysis at the beginning of every operative procedure that will last an hour or over. This hypodermoclysis enables the surgeon to obviate the occurrence of shock and 95 per cent. of the patients so handled come off the table with a pulse of 72, normal respiration and in a most favorable condition for recovery.

With regard to the role of anesthesia in precipitating acidosis, I desire to announce some experimental results of recent investigations that will be published later in detail. Series of guinea pigs have been anesthetized with ether-air and ether-oxygen, some receiving preliminary bicarbonate of soda alkalinization. Those pigs not receiving the bicarbonate of soda were all acidosed, whereas those who received the bicarbonate of soda showed normal or raised alkalinity of the blood. Further, those pigs anesthetized with ether-oxygen showed a higher per cent. of alkalinity than those anesthetized with ether-air.

Dr. E. I. McKesson, Toledo, Ohio: In regard to the question of cardiac compensation, which has been referred to, I have seen a number of cases in which the systolic blood pressure has been reduced, 40, 50 or 60 mm. of Hg., for a few moments and the patients recovered. But when extremely low pressures have persisted for 20 to 30 minutes, the longer they continued the less likely was the patient's recovery. These patients may not die for 2 or 3 days, but they do die. They seem unable to recover cardiac tone. When diastolic blood pressure is reduced, but the systolic pressure is maintained at practically the normal level for the patient, we have a cardiac compensation, which saves the life of the patient. The heart moves a larger volume of blood at each stroke and thus sustains systolic pressure. The double pressure maintains circulation and saves the patient's life, even though the diastolic pressure, which is the measure of the hypotonus, has indicated that the patient is approaching, but has not yet reached the stage of surgical shock.

When the heart from organic disease, severe strain, infection or rapid action has been worn out, or worn to the point where it will not compensate, we have a case when the patient is apt to go into surgical shock and not recover. It may take several days after the operation before the patient will finally succumb to heart exhaustion.

AN EVALUATION OF ETHYL CHLORID ANESTHESIA.*

Martin M. Ware, M. D., F. A. C. S.
New York City.

I gladly respond to the invitation of a most accomplished anesthetist—your secretary—to bespeak the worth of ethyl chlorid, because of my undiminished confidence in its efficacy since I first made use of this agent sixteen years ago.

The vulnerable point of any anesthetic is the mortality attendant upon its use. Being engaged in the practice of surgery, I have not followed the comparative death statistics of various anesthetics, and therefore speaking solely for myself, in the administration of many thousands of ethyl chlorid anesthesias conducted for me, I have no death to report.

In a communication reported to the Society of Surgeons of Paris but a few weeks ago, Dr. Cazin extolled highly the value and safety of ethyl chlorid, in support of which he cites the statistics of Malherbe of 6,275 cases of ethyl chlorid anesthesias, including infants a few months old and adults of every age, in which there was not a single complication. Cazin has operated with ethyl chlorid for an hour to an hour and a half with excellent results. Such has been also my experience.

An evaluation of the death rate based on an analysis of all of the statistics to hand leads me to claim a mortality of one in 15,000. I arrived at this approximate figure by eliminating such deaths coincident but not incident to ethyl chlorid anesthesia.

Thus irrelevant is the death of a child twelve months old, with diphtheretic obstruction of the larynx, when about to be tracheotomized. Another death occurred during the removal of adenoids and tonsils in a child which necessitated tracheotomy. The surgeon thinks a piece of the growth fell into the larynx. Another death is reported twenty-four hours after ethyl chlorid. Operation, gastroenterostomy. Finally we come to a death following the discontinuation of ether which had been preceded by ethyl chlorid, and local anesthesia. In computing the death rate for ether or chloroform, we would eliminate such fatalities and assign the responsibility to contributary negligence of the anesthetist. In fact, every commentator on the topic of ethyl chlorid mortality is impressed with the fact that other elements present, independent of the anesthetic, may be responsible for the mortality.

The very fewest deaths during its administration are assigned to cardiac or respiratory failure. But this is not surprising when one takes into consideration the very brief duration of most of the ethyl chlorid anesthesias. Yet the occurrence of these fatalities is particularly heralded in the earliest stages of ether or chloroform anesthesia. It is meet at this moment to emphasize that in the very larger field of the application of ethyl chlorid at the present time, preliminary to ether, no hasty death from respiratory paralysis or cardiac failure is reported. Such assurances ought to dispel any fear as to its safety and efficiency upon longer administrations. Facts borne out by actual experience prove that its field is by no means limited to introductory anesthesia.

The safety of ethyl chlorid anesthesia introductory to ether is no longer impugned. I therefore bid fair to predict an ever-widening field of its application. Exceptionally is its use indicated for very long anesthesias. The main objection here being its expense. In many regards it outdistances nitrous oxid. It causes no cyanosis, no increase of blood pressure, no increased flow of blood and no rigidity. The quantity at hand is always visible, and no expensive or bulky apparatus is required. Attempts to widen the field of nitrous oxid and to overcome the disadvantages are familiar to us in the recommendations to precede its use with an injection of morphin and during its exhibition for long anesthesias to use oxygen. These same adjuvants, coupled with ethyl chlorid, will also greatly enhance its sphere of utility and safety.

There are a vast number of painful conditions calling for the use of the knife or some equally painful procedure which, to the opprobrium of the physician, are not given the benefits of an anesthetic. Contrast this with the practice of dentists, whose cornerstone is nitrous oxid. What explanation have we to offer for such dereliction? It is that the physician and the surgeon have not at their disposal the outfit required for administering nitrous oxid. Viewed from every angle, ethyl chlorid is the most expedient anesthetic. A dentist of this city, recently deceased, used ethyl chlorid exclusively during the eighteen years of his private practice. He enjoyed a very large practice and won renown as a skilful extractor, because, with the aid of ethyl chlorid, he could do many extractions which others did not venture under nitrous oxid. His cases, which numbered in the thousands, were unattended by any mortality. Here is a test of safety conducted under the most exacting conditions.

Not a little antagonism against ethyl chlorid arises from its improper administration. This is the crux of the matter. The same precautions are called for as in the administration of the more favored anesthetics. If the ethyl chlorid is sprayed upon several folds of gauze with a very free admixture of air, a perfect anesthesia will follow somewhat more slowly, and be maintained with difficulty, owing to the volatility of the agent; and this wasteful method of using ethyl chlorid will be most expensive. The use of inhalers with rubber-bag reservoirs confines the volatilized ethyl chlorid, thereby reducing the quantity primarily used. The free admixture of air in sufficient quantity, with to and fro breathing of the bag content as with ether, favors a speedy and pleasant narcosis. When thus administered it is surprising how profoundly narcotized, completely anesthetized and thoroughly relaxed the subject becomes after a brief, preliminary and variable stage of excitement, more noticeable in neurotics and alcoholics.

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* Read during the Fifth Annual Meeting of the American Association of Anesthetists, New York City, June 2, 1917.

This safe and efficient narcosis may be continued at pleasure and it is equally astonishing to witness a recovery to complete consciousness within a few minutes, attended by such untoward complications as nausea and vomiting in exceptionally few instances and in a diminishing degree after proper preparation of the patient. The same degree of complete narcosis attained with ether or chloroform requires hours for recovery. With nitrous oxid pure or in combination with oxygen no such relaxation is ever witnessed. The amount of ethyl chlorid and the degree of anesthesia have to be gauged by the same criteria as any other narcosis and are too elemental to be described in detail.

In conclusion, I wish to thank you for the privilege afforded to address this body of anesthetists. I regard it rather ominously good for the survival and growth of ethyl chlorid anethesia that you sought to listen to the counsels of a surgeon regarding a foremost instrumentality in the pursuit of his work.

27 East 81st Street.

ABSTRACT OF DISCUSSION.

Dr. A. F. Erdmann, Brooklyn, N. Y.: I believe Dr. Ware and I are the local godfathers of ethyl chlorid anesthesia. This (showing inhaler) is a cornucopia inhaler I first showed in 1899. Combined with the capillary stem ampoules originally manufactured for me by Friess Bros., it offers a simple, satisfactory and efficient method of administering ethyl chlorid. I use ethyl chlorid a great deal and can recall administrations lasting three-quarters of an hour. It excells as a preliminary to other anesthetics and is very valuable in combination with nitrous oxid. The latter, however, is better suited to longer operations. Rigidity does occur occasionally and the general spasm of the muscles of the body, especially the masseters, may precipitate fatality. At present the cost of ethyl chlorid is decidedly increased and militates somewhat against its use.

Dr. I. D. Kruskal, Brooklyn, N. Y.: I have used ethyl chlorid for a number of years and have records of 7,000 administrations, in most of which it was used to induce anesthesia. The principle objection I have to ethyl chlorid is its tendency to promote nausea and vomiting, irrespective of whether it is given with abundant air supply or oxygen. Given by an open method it is the ideal anesthetic for children. It does not provide a great deal of relaxation, but I have found it serviceable in the reduction of fractures, in which considerable muscular relation is required.

Dr. R. H. Ferguson, East Orange, N. J.: I wish to call attention to the use of an apparatus employed by Dr. Guy, of the University of Edinburgh, which provides for the combined use of nitrous oxide and ethyl chlorid. One cannot witness the speedy induction, satisfactory operating and almost immediate recovery of the patients submitting to dental procedures in Guy's clinic without realizing that this combined anesthesia is a valuable method. The ethyl chlorid provides a longer operating period than the use of nitrous oxid alone. Personally, from an experience of several thousand administrations I have not always been able to secure relaxation. The routine use of this anesthetic has been opposed because the contraindications to its employment and its reactions have not been observed and studied. If administered in the presence of stenosis of the air passages or status lymphaticus it may cause trouble. Ethyl chlorid is comparatively safe in the hands of experts, but dangerous when administered by those who wish to push it to the point of securing relaxation and overcoming tonic or clonic spasm which are prone to occur during its maintenance.

Dr. A. F. Erdmann (closing): Relaxation under ethyl chlorid is usually obtainable, although with difficulty in a few instances. It is imperative to stop short of stertorous breathing in its administration. With this anesthetic available it is really a reproach to the medical profession at large that painful procedures should ever be performed without its use. Few physicians, aside from anesthetists, have the facilities for nitrous oxid anesthesia, but ethyl chlorid is available for all and the trick of using it safely can be readily acquired. Physicians should be encouraged to administer ethyl chlorid as their routine, emergency anesthetic.

THE INTERSTATE ASSOCIATION OF ANESTHETISTS WILL HOLD ITS THIRD ANNUAL MEETING IN TOLEDO, O., OCTOBER 9, 10, 11, in CONJUNCTION WITH THE MISSISSIPPI VALLEY MEDICAL ASSOCIATION. AN INTERESTING AND INSTRUCTIVE SCIENTIFIC PROGRAM HAS BEEN ARRANGED. THERE WILL BE A SPECIAL SECTION ON ANESTHESIA FOR ORAL SURGERY AND DENTISTRY. ANESTHETIC AND WAR SURGERY FILMS WILL BE SHOWN. MEMBERS OF THE ALLIED PROFESSIONS AND THEIR LADIES IN ATTENDANCE WILL BE DELIGHTFULLY ENTERTAINED.

* * *

COL. T. H. GOODWIN, R.A.M.C., OF THE BRITISH WAR MISSION WILL ADDRESS THE JOINT-SESSION ON THE MEDICO-MILITARY PROBLEM BEHIND THE BATTLE FRONTS AND HOW THE ALLIES HAVE SOLVED THEM.

* * *

MOVING PICTURES WILL REPLACE CLINICS AND NEW FILMS WILL BE SHOWN BY DRS. IRA O. DENMAN, JOS. BECK, C. E. TURNER AND W. I. JONES, A. M. NODINE, A. E. SMITH, RICH. H. RIETHMULLER, THOMAS ALLERS AND M. ECKER.

American Journal of Surgery

QUARTERLY SUPPLEMENT *of* ANESTHESIA *and* ANALGESIA

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F. HOEFFER McMECHAN, A.M., M.D., *Editor*

Avon Lake, Ohio, U.S.A.

OCTOBER EDITORIALS. **1917**

THE NURSE-ANESTHETIST CONTINUED.

From an opinion of Attorney General McGhee of Ohio, recently rendered Senator Howell Wright, who represents the proponents of the nurse-anesthetist, it appears that the previous stand of the Ohio State Medical Board, declaring the nurse-anesthetist illegal, will be forcibly maintained. Senator Wright has announced his intention of taking the matter into the courts, but the law in Ohio has a clause in the section referring to registered nurses which provides that nothing in its context shall come in conflict with the existing medical practice act. The law in Kentucky did not specifically apply to nurses and consequently the Court of Appeals was forced to allow nurses to administer anesthetics and do anything else in medicine or surgery. This lack of regulating the privileges of nurses will be controlled by remedial legislation.

The Attorney General of Tennessee has also ruled against the nurse-anesthetist.

In view of the fact that Dr. A. D. Bevan, President Elect of the A. M. A., and Chairman of the Council on Medical Education, who for seventeen years has fought for higher standards in medical education and training, has definitely aligned himself in favor of qualified and licensed medical and dental anesthetists, it looks as if the matter of the nurse-anesthetist were reaching a point where it will be handled decisively.—McM.

RESEARCHES IN ANESTHESIA.

The close student of the historical evolution of anesthesia is quite aware of the fact that even ten years after the pioneer discoveries of Long, Morton, Wells, and Simpson, ether and chloroform anesthesia were so dangerous and unsatisfactory, that had not Dr. John Snow, anesthetist to the famous surgeon Liston, gone into his laboratory, where he had previously studied asphyxia, and placed anesthesia on a scientific basis of laboratory research, this beneficence to humanity might have fallen into disuse.

There is really no need to emphasize the value of research in anesthesia. The present issue of the SUPPLEMENT speaks for itself. The investigations of Davis, Muns, Epstein, Mann and others indicate clearly that all the underlying problems of anesthesia are far from solved. Their efforts to add to the science of anesthesia as well as to its art and practice is not only commendable but should prove very stimulating. If the scientific programs of the associations of anesthetists maintain the standards already set, these organizations will certainly be achieving their primary purpose. THE EDITOR will appreciate being kept in touch with the researches of other investigators.—McM.

THE NATIONAL DENTAL ASSOCIATION AND ANESTHESIA.

It will be recalled that the National Dental Association at its meeting in 1916 accorded the Interstate Association of Anesthetists the courtesy of being its Section on Anesthetics. This year, the National Dental Association has its own Committee on Anesthetics, and its secretary, Dr. Chalmers J. Lyons, of Ann Arbor, Michigan, announces the following papers for the New York City meeting, October 22-26: "The Teaching of Conductive Anesthesia," Theodore Blum, D. D. S., New York City, "After-Pain in Local and General Anesthesia," Arthur E. Hertzler, M. D., Kansas City, Mo., and "The Toxicity of Local Anesthetics," George B. Roth, M. D., Washington, D. C.

The subjects are pertinent and the essayists preeminent members of the allied professions. It is certainly pleasing to note that the meeting in Louisville cemented such cordial relations that the National Dental Association has found it desirable to continue the precedent of having medical as well as dental experts in anesthesia on its programs. This is another indication of how closely the interests of the allied professions are being consolidated.—McM.

THE CALL TO THE COLORS—SPECIAL SERVICE IN ANESTHESIA.

With the call to the Colors resounding throughout the homeland, anesthetists have been and are now responding with alacrity. Medico-military necessity as well as the continued welfare of the civilian population will make extended and tremendous demands on the medical profession at large and on the members of certain specialists in particular. Many anesthetists are already doing their bit in the war hospitals behind the far-flung battle lines of Flanders and France. Many more are required and these are promptly requesting commissions from the Surgeon General, indorsed with a plea for immediate service, which will, no doubt, be accorded them.

Major Grayson P. Murphy, heading the Red Cross Commission to France, recently cabled for a shipment of 100,000 half-pound tins of ether and for the machinery, operatives and material for establishing a large nitrous oxid-oxygen plant in France, as this form of surgical narcosis will be routinely used in the graver operations. The fact that this difficult technic will be extensively employed is evidence enough that many experts will also be required for its administration. These experts cannot be withdrawn from the hospitals at home without leaving competent and trained anesthetists to take their place. Consequently those who anticipate entering service should provide some one to do their work during their absence.

The problem involved in maintaining the supply of anesthetists is such that the interest of the National Council of Defense, the Red Cross, the Surgeon General, the allied war missions, has been sought in cooperation with the efforts of the organized anesthetists to work out an efficient plan.

Women physicians, specializing in anesthesia, will have an opportunity of serving and should immediately communicate with Dr. Alma Vedin, 224 East Fifteenth Street, New York City, who is chairman of the Subcommittee on Anesthetists of the Women's War Mission, organized under the direction of Dr. Rosalie Slaughter Morton, who has already been decorated by the French Government for her services in the war zone.

Anesthetists should make every effort to meet the grave responsibilities that are at hand. That they will do so is a foregone conclusion.—McM.

While patriotism demands sacrifices, it also provides opportunities. This is the time to have a hand in recasting the ideals of the world so that all countries, henceforth, may be more desirable to live in.

Book Reviews

A carefully selected library is essential to a thorough knowledge of the science and practice of a specialty.

Proceedings Royal Society of Medicine: Section of Anesthetics: Vol. IX, 1915-16. Edited by J. Y. W. MACALISTER. Published by LONGMANS, GREEN & CO., Paternoster Row, London, 1916.

This volume of the Proceedings continues to show the ravages of war on scientific literature. It contains the Transactions of but a single meeting of the Section on Anesthetics, which was devoted to a paper on "Observations on the Influence of Anesthetics on the Temperature of the Body," by M. S. Pembrey and F. E. Shipway with a discussion of the same. This paper is of particular importance as Shipway's contention that warmed ether-vapor is strikingly protective as a method of anesthesia in the seriously wounded and those in shock, has been borne out by the clinical results of many surgeons and anesthetists in the war hospitals behind the far-flung battle lines in France.

Encyclopedia of Foods and Beverages. Compiled by ARTEMUS WARD. Buckram bound, pages 748, copiously illustrated with Engravings and Colored Plates. ARTEMUS WARD, Publisher, 50 Union Square, New York. 1917.

This work is unique and difficult to describe in brief. It might be spoken of as the pharmacognosy of dietetics. It is eminently practical and deals exhaustively with all foods and beverages, how they are raised, prepared and marketed; how to care for them and how best to use and enjoy them.

Dietitians and dietetics both suffer from a lack of information on what foods and beverages are actually available and this lack of knowledge accounts for the limited scope of the average physician, surgeon and specialist in utilizing foods and beverages for the benefit of patients as well as their delectation.

While not making any pretense of covering all the scientific details of dietetics, the Encyclopedia is by no means superficial nor solely commercial. It is an ideal volume for the hospital superintendent and for the reference of the medical and nursing staffs.

By a polyglot and unilingual glossary, the common food names are given for French, German, Italian and Swedish. There is an equally needed glossary of "culinary and bill-of-fare items."

The colored, full-page plates are really beautiful. Beginning where the standard text-books on dietetics leave off the Encyclopedia gives a vast amount of practical and scientific information about foods, natural and artificial, which every one, who has any serious interest in dietetics, food sanitation, and economics of food will find invaluable. It will save many hours of unavailing consultation of botanies, inquiries of horticulturists and other raisers and conservers of foods, and similar attempts to learn more about foods than is given in the usual text books.

The Practical Medicine Series: General Surgery: Vol. II. Edited by ALBERT J. OCHSNER, M.D., F.R.M.S., LL.D., F.A.C.S. Cloth bound, pages 608, Illustrated with line drawings, halftones and colored plates. THE YEAR BOOK PUBLISHERS, Chicago. Series 1917.

Ochsner, who assumes the editorship of this volume of the series, pays a glowing tribute to his predecessor John B. Murphy.

The anesthetic progress detailed begins with a consideration of the legal status of the nurse-anesthetists and introduces the recent test-case in the Kentucky courts. Bazy is quoted on the effects of general and local anesthesia on the aged and Coburn elucidates the advantages of alkaloidal adjuvants. Wilkie resurrects the single dose administration of ether, which was the method of Morton and other pioneers, and was popularized some years ago as the "ether rausch" of the Germans. Wilkie has found the method available for minor surgery. Kruskal reports the results of 1000 administrations of the essence of orange-ether sequence by the closed method, and Gwathmey volunteers to demonstrate that warmed ether with oxygen is as good, from every viewpoint, as gas-oxygen anesthesia. McCarty and Davis do not corroborate the contention that warmed ether vapor has any peculiar adantages, while Pembrey and Shipway insist that warmed anesthetics do have a beneficial effect.

The ethermoter of Montgomery is described, as are also the masks of Kingsford, Wilkie and Engstad.

Alma Vedin's experiences with endotracehehal insufflation anesthesia are given as well as W. M. Johnson's and Evropin's results with ether-oil colonic anesthesia.

The discussion of the safety of nitrous oxid-oxygen anesthesia, raised by J. F. Baldwin is supplemented by the opinions and results of Coburn, A. H. Miller, Gwathmey, McCardie, Robinson and others.

Ethyl chlorid is coming into its own in war surgery and MM. Carles and Charrier cordially indorse its use. Peck and Meltzer have used magnesium sulphate anesthesia, intravenously, in several cases, but its safety and utility are still doubtful.

Farr and Bartlett show devices for facilitating local anesthesia when used for a number of patients.

Stanley, Holman and Gadgil report their successes with spinal anesthesia, and Allen, Hertzler and Lewis their results with epidural anesthesia.

Accidents and complications of anesthesia are considered by G. Schiel, H. R. Phillips, A. Vedin and F. H. McMechan.

The remainder of the volume details the progress of General Surgery and indicates the advantages of certain methods of anesthesia or analgesia for specific operations, when necessary.

Society Proceedings

Membership in a society devoted to your specialty is an essential to success.

INTERSTATE ASSOCIATION OF ANESTHETISTS THIRD ANNUAL MEETING—TOLEDO, O., OCTOBER 9, 10 AND 11.

Beside the papers of the scientific program already announced for the Third Annual Meeting of the Interstate Association of Anesthetists, Hotel Secor, Toledo, O., October 9, 10 and 11, in conjunction with the Mississippi Valley Medical Association, the following features have been arranged for.

Moving picture demonstrations will be given in the Temple Theatre by Dr. M. Ecker, Low Pressure Nitrous Oxid-Oxygen Anesthesia by Nasal Administration; Dr. Thomas Aller, Extractions under Nitrous Oxid-Oxygen Anesthesia; Dr. Ira O. Denman, Operations in the Forward Inclined Sitting Posture; Dr. Joseph C. Beck, Vapor Anesthesia for Oral Surgery; Dr. A. E. Smith, Methods of Conductive Anesthesia; Dr. Rich. H. Riethmuller, Why Conductive Anesthesia Fails; Dr. Pont, Plastic Surgery of the Face and Jaw. Other films depicting recent advances in war surgery and showing the work of the Red Cross will be exhibited.

The speakers at the Annual Dinner will be Dr. F. G. DuBose, Selma, Ala.; Dr. George F. Butler, Mudlavia, Ind.; Dr. Otto U. King, Huntington, Indiana and Dr. Lafayette L. Barber, Toledo, O.

The Committee on Arrangements, headed by Dr. W. J. Stone of Toledo, O., has scheduled the following entertainment. October 10, Buffet Luncheon for members and ladies at the Hotel Secor. Automobile ride for the visiting ladies with tea at the Country Club. Evening: President's reception, buffet lunch and dance at the Toledo Club. October 11: Theatre party at Keith's Theatre.

Covers for the Annual Dinner will be $2.00 a person. All those contemplating attending are cordially invited to bring the ladies to lend grace and charm to the occasion.

For additional information, dinner reservations, applications for membership, address

F. H. McMECHAN, M.D., Sec'y.,
Avon Lake, Ohio.

AMERICAN ASSOCIATION OF ANESTHETISTS, FIFTH ANNUAL MEETING.

The Fifth Annual Meeting of the American Association of Anesthetists was called to order in the Blue Room of the Hotel McAlpin, at 9.15 A. M., Saturday, June 2, 1917, by Dr. F. W. Nagle, Vice-President, in the absence of President Captain Dr. Walter M. Boothby, who was unavoidably absent on account of service with the Harvard Unit at the front.

The minutes of the Detroit meeting were approved as read and the Treasurer's report accepted.

The following new members were elected: Morris H. Clark, Kansas City, Mo.; Fred W. Culler, New York City; Wm. W. Dickey, New York City; Wm. G. Doran, New York City; James W. George, Minneapolis, Minn.; Wm. M. Hall, Penneville, Ind.; Thomas R. Hanley, Toronto, Ontario; R. F. Hastreiter, Los Angeles, Cal.; R. Franklin Hill, Philadelphia, Pa.; Robert E. Jameson, Davenport, Ia.; Marie B. Kast, Indianapolis, Ind.; H. Clifton Luke, New York City; Jean M. Martin, San Francisco, Cal.; Louis H. Maxson, Seattle, Wash.; George R. McAuliffe, Chicago, Ill.; Ben Morgan, Chicago, Ill.; Anna M. Mosgrove, San Francisco, Cal.; Louise A. Oldenburg, San Francisco, Cal.; Allen Galpin Rice, Springfield, Mass.; Louise Rosenzweig, Staten Island, N. Y.; Eleanor Seymour, Los Angeles, Cal.; Everett A. Tyler, Philadelphia, Pa.; Michael Vinciguerra, Elizabeth, N. J.; R. M. Waters, Sioux City, Ia.; Charles J. Wells, Syracuse, N. Y.

In view of the Call to the Colors, the Chairman appointed the following committee, Drs. A. H. Miller, C. H. Gallegher, F. L. Richardson and Charles K. Teter, and its Resolution, as follows, was unanimously adopted: *"The American Association of Anesthetists, a body of physicians whose object is the advancement of the science and art of anesthesia, anxious to serve in the present national crisis, offers its moral support and services to the Government in the interests of efficient anesthesia in the medical service of the Army and Navy; especially in the instruction of those who are to have charge of the administration of anesthetics in active service."*

Dr. Isabella C. Herb, of the Committee appointed at the Detroit meeting to investigate the teaching of anesthesia in the medical schools and teaching hospitals, reported that what material the Committee had been able to develop would be reported in the paper on: Anesthesia in the Curriculum and Clinic, by Dr. W. D. Gatch, to be read during the Joint-Session of the Sections on Physiology & Pathology and General & Abdominal Surgery.

As the papers of the Scientific Sessions will be published in the Supplement, there is no need to refer to them in this report.

The following officers were elected for 1917-1918: President, F. W. Nagle, Montreal, Canada; Vice-Presidents, Albert H. Miller, Providence, R. I.; Isabella C. Herb, Chicago, Ill.; Freeman Allen, Boston, Mass.; Secretary-Treasurer, James T. Gwathmey, New York City; Members of the Executive Committee, Yandell Henderson, New Haven, Conn., and Charles Baskerville, New York City.

The New York Society of Anesthetists acted as host to the American Association of Anesthetists for the delightful banquet served in the evening.

Following a delicious menu, the banqueters were entertained by several noted after-dinner speakers: Dr. Wm. H. Cantle, "A Few Bubbles"; Wm. J. Burns, "The Detective and the Doctor"; Hon. Stanley H. Howe, "Charity, Its Use and Abuse"; and Wm. J. Luckett, "The Surgeon and the Anesthetist."

Through the efforts of Dr. Isabella C. Herb of Chicago, the Joint-Session of the A. M. A. Sections on Physiology & Pathology and General & Abdominal Surgery was made of especial interest to the visiting anesthetists on account of the following pertinent papers: "Shock," Frank C. Mann, Mayo Clinic; "Anethesia in the Curriculum and Clinic," Willis D. Gatch, Indianapolis, Ind.; "Pulmonary Changes Following Intratracheal Anesthesia for Experimental Lung Surgery," Conrad Georg, Jr., Ann Arbor, Mich.; and "Some Observation on the Toxicity of the Common Anesthetics," Evarts A. Graham, Mason City, Iowa.

During the A. M. A. clinics, June 4-5, the anesthetists in attendance at the New York meeting had the stimulating experience of seeing all the routine and many of the newer methods of anesthesia and analgesia demonstrated.

Quarterly Index
Of the Current Literature of Anesthesia and Analgesia.

Acidosis, Relation of to Anesthesia. G. A. Caldwell and M. Cleveland, New York City. Surgery, Gynecology and Obstetrics, July, 1917.

Albuminuria, Postoperative. A Satire. Paris Medical, May 26, 1917.

Anesthesia, Case of Safety Pin in Esophagus, Displaced During, and Lodging in Postnasal Space. A S. Kaufman, Philadelphia. Laryngoscope, June, 1917.

Anesthesia in the Curriculum and Clinic. Willis D. Gatch, Indianapolis. Journal American Medical Association, August 4, 1917.

Anesthesia and Analgesia in Obstetrics. Harold Heffron, Matamora, O. Ohio Medical Journal, July, 1917.

Anesthesia and Operation, Effects on Kidney. R. Colp, New York City. American Journal Medical Sciences, June 1917.

Anesthesia, Safety First in. T. L. Dagg, Chicago. Illinois Medical Journal, June 1917.

Anesthetics at the Front, Administration of. G. Marshall. British Medical Journal, June 2, 1917.

Anesthetics, Some Actions of, Analyzed by Observation of Altered Cardiac Reaction to Calcium. W. Burridge. Quarterly Journal Medicine, Oxford. April, 1917.

Apparatus-Valve to Regulate Delivery of Air and Ether Vapor in any Proportions. F. L. Gates, New York City. Journal Experimental Medicine, July, 1917.

Chloroform Anesthesia, Fatal Jaundice and Albuminuria Following Third Administration of. N. Feissinger and R. Montaz. Revue de Chirurgie, September-October, 1916. (Published March, 1917) xxxv, Nos. 9-10.

Chloroform Anesthesia, Peripheral Paralysis Following. C. Pastine. Riforma Medica, March 31, xxxiii, No. 13, 1917.

Chloroform, Samuel Guthrie, Discoverer of. W. V. Ewers, Rochester, N. Y. Buffalo Medical Journal, May-June, 1917.

Conductive Anesthesia for the General Dental Practitioner. F. W. Rounds, Louisville, Ky. Dental Summary, May, 1917.

Conductive Anesthesia with Novocain for Exodontia. L. Biddle Duffield, Philadelphia. Dental Cosmos, July, 1917.

Ether as an Anesthetic in the Extraction of Teeth, Notes on the Use of. Leslie Curnock, London. Dental Digest, July, 1917.

Ether Anesthesia, the Treatment of Tuberculosis by. Walter E. Savage, Cincinnati, O. Ohio Medical Journal, July, 1917.

Ethyl Chlorid, General Anesthesia with in War Surgery. M. Boureau. Presse Medicale, May 17, 1917.

Legal Aspects of General Anesthesia in Dentistry: The Dentist Before the Law. Henry Schwamm, New York City. Dental Cosmos, June, 1917.

Local Anesthesia. F. G. Dyas, Chicago. Illinois Medical Journal, May, 1917.

Local Anesthesia, Limitations and Advantages of. Harvey F. Smith, Harrisburg, Pa. Pennsylvania Medical Journal, May, 1917.

Local Anesthesia, Abdominal Surgery under. R. E. Farr, Minneapolis. Journal-Lancet, May 15, 1917.

Local Anesthesia—the Technic of Suprapubic Prostatectomy. I. S. Knoll, Chicago. Urologic and Cutaneous Review, May, 1917.

Local Anesthesia for Tonsillectomy. J. A. Thompson, Cincinnati, O. Ohio Medical Journal, July, 1917.

Local Anesthesia for Tonsillectomy, Simplified Technic for. W. T. Patton, New Orleans. Journal American Medical Association, July 7, 1917.

Local Anesthesia for Hemorrhoidectomy: Technic of Infiltration, Extradural and Parasacral Anesthesia: Clamp and Cautery Removal. V. C. David, Chicago. Surgical Clinics of Chicago, June, 1917.

Local Anesthesia for Dentistry. Arthur E. Smith, Chicago. Dental Items of Interest, June, 1917.

Long, Crawford Williamson and Ether. E. M. Magruder, Charlottesville, Va. International Journal of Surgery, July, 1917.

Monoplegia, Postoperative Brachial. N. Frederici. Riforma Medica, April 21, 1917.

Nitrous Oxid-Oxygen Analgesia and Anesthesia in Obstetrics. G. G. Copeland, Toronto. Canadian Medical Association Journal, May, 1917.

Nitrous Oxid Analgesia, Use of in Obstetrics, with Description of a Simple Apparatus. T. H. Cherry, New York Medical Journal, June 30, 1917.

Nitrous Oxid Gas a, an Analgesic in 135 Cases of Labor. G. H. Ryder, New York City. American Journal of Obstetrics, June, 1917.

Nitrous Oxid and Ether Anesthesia, an Experimental Research into the Nature of. Geo. W. Crile, Cleveland, O. Dental Summary, June, 1917.

Novocain-Suprarenin. Emil Specht, New York City. Dental Items of Interest, June, 1917.

Oxygen, Compressed, for Medical Purposes. Tilden Adamson, New York City. Journal American Medical Association, June 2, 1917.

Rectal Anesthesia: Case of Cesarean Section under. A. E. Panting. Medical Journal of Australia, May 12, 1917.

Shock, Surgical, Suggestion for Treatment of: Use of Pituitrin. Editorial. Journal American Medical Association, July 21, 1917.

Resuscitation, History and Analysis of Methods of. S. J. Meltzer, New York City. Medical Record, July 7, 1917.

Shock During General Anesthesia. F. C. Mann, Rochester, Minn. Journal American Medical Association, August 4, 1917.

Shock, Surgical, Respiratory Suction as an Aid in. W. T. Porter, Boston. Boston Medical and Surgical Journal, May 10, 1917.

Shock, Traumatic, the Relation of Low Blood Pressure in a Fatal Termination. F. H. Pike and Helen C. Coombs, New York City. Journal American Medical Association, June 23, 1917.

Stomach, Acute Dilitation of: Report of Six Cases, Three under General Anesthesia. F. B. Reardon, California State Medical Journal, July, 1917.

Spinal Analgesia. A. W. B. Livesay. Journal Royal Naval Medical Service, January, 1917.

Spinal Anesthesia. C. C. Yount, Panama City. Surgery, Gynecology and Obstetrics, July, 1917.

Spinal Anesthesia with Tropococain. H. A. Cheng. National Medical Journal of China. March, 1917.

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RENAL MISPLACEMENT, RENAL HEMATURIA AND RENAL INFECTION.*

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I have selected this composite subject on account of the important place that each one of its subdivisions holds in the pathology and treatment of disorders of the kidney, and because of certain interesting phases of each, perhaps less hackneyed than some other rénal abnormalities, which afford the opportunity of discussing the interrelationship of these conditions. While material along this particular theme is not lacking, it seems to be quite widely scattered, and with some exceptions, is treated in an unsystematic fashion rather than by concise method. That hematuria, infection or misplacement of the kidney may exist independent of each other, there is not any doubt; and that they may and often do all appear in the one subject, is equally so. Therefore, while one is not essential to the other, and while they do not coexist, just what dependence, if any, one has upon the other is an appropriate topic of discussion in the consideration of the pathology and treatment of disorders of the kidney.

It is not necessary to repeat here what every surgeon knows, the statement of Moullin that all kidneys are movable—physiologically movable—in a vertical plane and this range of movement varies within normal limits, sometimes being even as great as 5 centimeters. The detection of such a degree of mobility, especially of an organ in a long, narrow thorax, might lead to the diagnosis of a pathologically movable kidney, despite the absence of clinical symptoms or of laboratory findings. It is the kidney that is movable in a horizontal plane—in a word, the tilted kidney—that is more apt to give rise to pronounced symptoms for it is an indisputable fact, which will be emphasized here, that movable kidney is a condition that may, on the one hand, give rise to no symptoms whatever, while in other instances, it may be attended by grave phenomena. Furthermore, the severity of the symptoms does not bear a direct ratio to the degree of mobility. There are other factors that may be revealed as the determining influence in the production of active symptoms, directly or indirectly, to be considered later on.

Various causes for undue mobility have been ascribed. A number of observers (Bruce Clark and Glantenay and Gosset) have called attention to the chief cause in the absence of fibrous tissue bands by which the kidney is attached to the back of the abdominal cavity. I have frequently noted, in operating, a total absence of these bands in freely movable kidneys, and the necessity of releasing them for the dislodgment of an immobile kidney. As to the variety of symptoms and their frequency, I find from examination of records of a series of cases of recognized movable kidney that somewhat less than 50 per cent complained of the symptom of pain alone suggesting kidney distension. In over 10 per cent there was evidence of actual obstruction producing stasis in the form of hydronephrosis or pyelitis. In over 5 per cent there was added infection. In 33 per cent there were gastro-intestinal disorders.

The kidney may descend into the iliac fossa when the patient stands upright or coughs, causing merely a feeling of discomfort. On the other hand, it may descend so slightly that it can scarcely be felt by the palpating hand, and yet, on the one hand, its pressure upon the adjacent structures by tilting may cause severe symptoms outside the kidney, which lead to a confusion in diagnosis; or the twisting of a short pedicle may be the cause of marked circulatory disturbance within the kidney.

A kidney that descends behind the peritoneum and fascia that normally form its anterior covering may become hydronephrotic from a kinky ureter; or from repeated bruising it may invite the deposit of tubercle from some other part of the body, the alimentary or pulmonary tract; or it may become the nidus of a calculus. Vertical displacement is not so apt to affect other organs. It is rather the kidney that tilts forward at the top, first described, I believe, by Potain, as anteversion of the kidney, that affects the other organs and causes a variety of symptoms apart from the kidney itself. Therefore the symptoms of misplaced and movable kidneys may be divided into (a) those produced within the organs themselves and (b) those produced in adjacent organs and other parts of the system. We are particularly concerned with the direct influence upon the organs themselves. As phrased by J. B.

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* Read before the N. Y. Urological Society, April 11, 1917.

Murphy: "Misplaced kidneys are liable to the same diseases as when located normally. In fact, some authors believe they are unusually predisposed to the various affections." And yet, to iterate the above statement, movable or misplaced kidneys may give rise to no symptom whatever over a long period of time.

The first and most likely local result is *acute congestion* due to torsion of the kidney upon its vessel and upon the ureter, and thereupon follows the sequence of acute hydronephrosis with the symptoms of Dietl's crisis.

A number of personal cases could be cited that have presented that classical train of symptoms expressive of the so-called Dietl's crisis and formerly considered almost conclusive evidence of stone in the kidney or ureter—and that were in reality instances of urinary stasis due to a variety of causes that interfered with pelvic drainage. The literature contains many similar examples.

Dietl's crisis may result from violent exercise, or may come on without apparent cause. The frequency may gradually increase or diminish. In some instances, the kidney remains chronically painful and almost constant dull backache replaces the acute attacks. It is sometimes difficult to gather the true significance of the symptoms until some of the severe attacks are witnessed. In the acute attack the patient is prostrated with sudden, severe pain, and frequently vomiting occurs simultaneously. The urine may become scanty and stained with blood; again, it becomes smoky, resembling the urine of acute Bright's disease; infrequently, marked pyrexia and general constitutional symptoms are noted.

Another result of torsion is the second subdivision of our subject, viz, *hematuria,* transient or more or less permanent in character, depending upon the degree and persistence of the torsion. What a vista of pathological and etiological possibilities does this symptom, hematuria, open up! Apart from neoplasm, stone, tuberculosis, and constitutional renal involvment, with none of which are we here concerned, there is a large number of cases presenting renal hematuria, in which it is most important to gain a clear understanding of the etiological and pathological factors. In attaining this end, it is desirable to have in mind the condition under which hemorrhage occurs in other parts of the body, rather than to individualize too specifically in the explanation of kidney bleeding. A graphic example is the obvious hemorrhage as the principal symptom of rupture of the kidney which needs no explanation. Again attention has been called to the temporary appearance of blood in the urine after palpation of a floating kidney, but apart from this, blood in the urine is not an uncommon symptom in association with mobility of the kidney. It is commonly found microscopically, but rarely enough to impart to the urine its characteristic color. Cases in which there have appeared large quantities of blood have been intermittent in character suggesting a superadded cause. For example, a patient with movable kidney, while moving about in activity, suffers a sensation of fullness on the affected side, and a more or less liberal amount of blood is seen in the urine; the kidney, when examined, is found abnormally low and sensitive. When such a patient is put to bed, there often follows a decrease of blood in the urine and the cessation of attendant tension. Here, then, is a common explanation of renal hematuria, of which one case after another might be cited, namely, interference with the renal circulation, causing congestion, and according to the extent of the latter, tension, ecchymoses, and the microscopic or macroscopic appearance of blood in the urine.

In a word, it may be stated that anything that will cause sufficient tension of the walls of the bloodvessels, will produce a relative amount of renal hemorrhage. Most writers recognize the relationship of mobility of the kidney to hematuria and regard congestion resulting from renal mobility as the sole cause of such hematuria; others, however, insist upon the causative agency of nephritis.

Now, then, assimilating for purposes of discussion, these two main contentions, we will divide the causes of renal hematuria of the class under consideration into extrinsic and intrinsic causes, and tersely summarize all of the variously given extrinsic causes of renal hemorrhage, as all of those causes which directly or indirectly produce renal congestion. The intrinsic causes, in like manner, we must again group, as those causes which will produce renal congestion.

It is unnecessary for us to dwell here upon the many possibilities of interference with the renal circulation extrinsically. I have referred to renal mobility and torsion. We have all of us seen or read of cases that occurred as a result of the pressure of external growths, and of abnormal bloodvessels. In short, they may be summed up as all of those causes that produce obstruction to the blood supply and to the urinary outflow.

Let us now consider concisely the intrinsic causes of renal hemorrhage, which, for purposes of discussion, we must assume may also be dependent upon renal congestion. What, then, may be the sequence of events leading up to and following the period of congestion? We are familiar with the occurrence of hematuria as a result of chemical irritation from the ingestion of certain drugs, such as cantharides, and cannot deny the rôle of congestion here. We have been taught the symptom of hematuria associated with certain constitutional diseases, in the clinical history of which non-pathogenic bacteria and parasites are eliminated by the kidneys, and realize that congestion is the active local condition resulting therefrom.

And this thought directs attention to a most important explanation of many obscure cases of renal hematuria, the third and last subdivision of the topic under present discussion, namely, *renal infection.*

If renal congestion is a step in the direction of renal hemorrhage, is it not also a further step in the direction of renal infection, and renal mobility has, therefore, a relationship to both. A great number of chronic urinary tract infections are associated with a pre-existent bladder condition or kidney ptosis, or both; but, that unilateral nephritis is, as one author states (Haddon, *California State Medical Journal,* Vol. 11, No. 8, 1913) a condition of infection having its origin in a kidney sag, is true in some instances, though by no means in all. The same author expresses the conviction that many movable kidneys are without pathological significance, because the muscle-tone is unimpaired, which is true of the ureter and may well be so with respect to the kidney. When the muscle-tone becomes impaired, there develop urinary stasis and infection. This point has been well brought out by animal experimentation by Barber. (*Jour. A. M. A.,* Jan. 16, 1916.) Every movable kidney, then, is a latent source of trouble, namely, infection, the degree of which depends upon the nature of the latter, and the susceptibility of the tissues. In consideration of the bearing of mobility or displacement of the kidney upon urinary infection it may be stated that bacteriological examination of the urine affords one of the means of diagnosing and classifying pathological floating kidney.

Let us touch briefly upon the bacteriology of the urine in relation to movable kidney, starting with the premise that normal urine is sterile. And yet, by the same token, bacterially infected urine does not necessarily presuppose an existing lesion in the urinary tract, for it is known to be a fact that when bacteria circulate in the blood they are eliminated by the kidneys and they may pass through these organs without leaving their mark behind in the form of an appreciable morbid lesion. What is true of the kidney is true of the bladder. As Cabot states in his exhaustive study of *The Etiology and Pathology of Non-Tuberculosis Renal Infections* (Cabot and Crabtree, *Surgery, Gynecology and Obstetrics,* November, 1916) "Bacteria circulate in the blood and are excreted by the kidney without producing gross lesions; and that they do not do so invariably simply confirms the fact that, in the presence of bacteria, infection of the kidney is determined by certain conditions locally and of the general organism. As it is an inherent function of all parts of the body to resist, and if possible, destroy invading bacterial organisms, likewise, to furnish their expulsion by way of the excretory channels, so it is obviously one of the purposes exerted by the kidney function in default of which there is determined a kidney lesion, and what is termed a lack of resistance on the part of the renal tissues is in part measured by the damage produced by bacterial organisms in transit."

Some of my early cases of renal hematuria of the type that are referred to here, those which were classed, loosely, as idiopathic and essential hematuria were submitted to what now seems a course of doubtful propriety primarily, namely nephrectomy. They afforded, however, an opportunity for laboratory investigation of the existing morbid lesions. In most of the cases hematuria was the sole symptom. Microscopic sections of the kidney showed congestion of both vessels and glomeruli and the characteristic evidences of parenchymatous nephritis. As evidence that this was a one-sided process, some of the cases have been followed over ten years, and two of them, females, gave birth to children during this period, without serious renal complications.

As the outcome of this cursory discussion of three important features of diseases of the kidney, what may be considered their interrelationship, and what practical deduction may be derived as a basis of directing measures of relief?

In the case of movable kidney, if there be no interference with the flow of urine or the passage of blood through the kidney, no symptoms are likely to be produced within the organ itself. Pain is an indication of renal distension. Descent, alone, of the kidney, is by no means sufficient to produce the symptoms growing out of interference with the blood supply or renal outflow. There is usually added the element of torsion or external pressure as a determining cause of symptoms.

Interference with emptying of the pelvis of the kidney, as in the bladder, is a fruitful source or factor of contributory toward infection, or a hindrance to the disappearance of an existing infection. Therefore, whatever impairs the musculature of pelvis or ureter may be considered as a predisposing cause of infection.

Bleeding from the kidney, like that from the other organs, is always due to an impairment of the continuity of the walls of the bloodvessels, which may be either mechanical (traumatic) or inflammatory (infective).

As evidence of the co-relation of these three phases of kidney disorder are the simple rules upon which the treatment of any one of these conditions, individually or of all of them collectively, may be based.

First: In the case of hemorrhage from the kidney, alone, where there may be either a movable kidney or a movable infected kidney, the indication is for normal and free drainage. This may be attained by fixation and possibly decapsulation. In fixation of the kidney it is important that the question of adequate drainage be considered, for without such provision, urinary stasis may be the forerunner of infection or infection that already exists may not be relieved and hence a failure to control the hematuria may result or a relapse may occur.

Partial or complete decapsulation of the kidney is utilized as an assistance to fixation. Splitting of the organ from pole to pole is undesirable and the ultimate effect upon the kidney unfavorable.

Removal of the kidney that is movable alone, is never to be considered, removal of a mildly infected kidney without suppurative foci is undesirable, and removal of the organ on account of hemorrhage is also to be discountenanced.

The principal demands of operative interference are, as already stated, normal fixation and adequate drainage and the maximum result, it is believed, can be attained when these conditions are properly enforced. When, however, they fail nephrectomy may be necessary; but such a contingency, I believe, is the exception, and is to be contended against as far as possible. In one of my cases the hemorrhage ceased for ten years and then returned. In another, the most recent one, hemorrhage was not controlled by fixation and it is my intention to make a second attempt with a view to obtaining more adequate drainage.

I would finally call attention to the probability that in some instances insidious infection of the renal parenchyma is the underlying cause of renal hemorrhage and failure to discover the former may be due to inaccurate laboratory technic, as is the cause of failure to discover microorganisms in mild bacteremia; and I am firmly of the belief that if the truth is told, in a large percentage of the cases of renal hematuria of nondescript character and undetermined cause an adequate examination of the parenchyma of the kidney would discover the presence of bacterial contamination as the real underlying factor on top of a primary renal congestion.

THE EMBRYOLOGY OF THE PROSTATE AND ITS RELATION TO THE SURGERY OF OBSTRUCTIVE CONDITIONS.*

Oswald S. Lowsley, M. D.,
New York City.

The human prostate gland begins to develop at the third intrauterine month from five different foci. These foci, as I have shown in a previous communication, originate as solid epithelial outgrowths from the posterior urethra and later from the five lobes of the prostate gland. The solid finger-formed buds later develop lumina which always remain small compared with those of the adult prostate until the great increase in size at puberty. At that time the epithelium, which has previously consisted of cuboidal cells two or three layers thick, become cylindrical in type and one layer in thickness, resting upon a felt-work membrane.

The five groups of tubules from which the gland originates become the five lobes of the prostate, namely: anterior, posterior, right and left lateral and middle lobes. The anterior lobe in early embryonic life is as prominent as other lobes of the prostate, but it usually atrophies about the time of birth. In some cases, as in that of a 17-year-old boy in my series, it remains as large and prominent as any of the other lobes, and there are several instances in which an hypertrophy of the anterior lobe tissue has occurred.

The posterior lobe is always present and is separated from the middle and lateral lobes by a rather firmly knit lamella of connective tissue in which the ejaculatory ducts are embedded.

The two lateral lobes and the middle lobe develop separately, as has been described, but they are not separated from one another by partitions of any sort and from the surgical standpoint their separate origin is of no consequence.

The subcervical group of tubules described in detail by me begins to develop at the fourth intrauterine month and these become of considerable consequence, due to the fact that they grow back just under the mucosa of the urethra and within the sphincter and, as my studies have shown, they become enlarged in almost 25 per cent of men over 30 years of age. They form several types of tumors at the floor of the vesical orifice; the single tumors of varying sizes, the partially divided tumors and those divided into three portions. This condition occurs probably because of the continual pressure exerted by the action of the so-called Bell's muscles during each urinary act.

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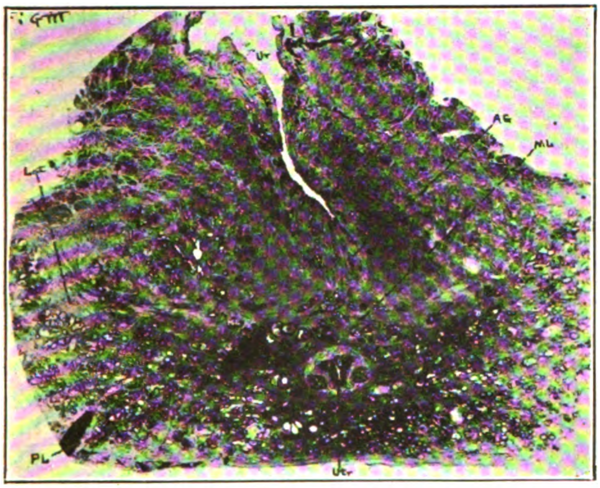
* Read before New York Branch of the American Urological Association, December 6, 1916.

The anatomical arrangement of the different portions of the prostate are of the utmost importance in the various surgical procedures in attacking pathological conditions of the prostate.

In complete resection of the prostate for carcinoma the seminal vesicles in their entirety must be removed at the same time. The reason for this is that carcinoma, when primary, usually begins to develop in the posterior lobe and there is quite free communication of the vascular and lymphatic elements between the posterior lobe of the prostate and the seminal vesicles. In carcinoma of the prostate the rectum is involved late and high up, due to the pressure of the thick leathery fascia of Denonvilliers, which is a reflection of the peritoneum which extends to the apex of the prostate in fetal life and later becomes closed off from the main peritoneal cavity. It is also due to the presence of the triple-layered intravesicular fascia which binds the seminal vesicles to each other and causes dissemination from this source to be considerably delayed. The fact that the seminal vesicles are so closely bound to the prostate and so well isolated from surrounding structures by the various envelopes mentioned compels the surgeon to remove the entire structure when there is a question of operable carcinoma.



Fg. I. Cross section at the level of the region just above the upper end of the verumontanum of a man 34 years of age (section cut slightly obliquely) Ur., Urethra and portion of bladder lumen. AG. Albarrans glandular tubules., ML. Middle lobe tubules., Lat., Lateral lobe tubules. PL., Posterior lobe tubules. Utr., Utriculus prostaticus and ejaculatory ducts bound firmly together in envelope.

There are several important anatomical points to be borne in mind by the surgeon performing Young's perineal prostatectomy. In dissecting down upon the prostate the recto-urethralis muscle, a small ribbon-like muscular structure attaching the apex of the prostate to the rectal wall must be divided, otherwise there is danger of tearing through the wall of the rectum into the viscus. One recognizes the posterior surface of the prostate upon separating the levator ani muscle by the glistening fascia of Denonvilliers, which clings tightly to the posterior surface of the prostate.

In order to penetrate the lateral and middle lobe areas, the portions in which the hypertrophy occurs, one must make the lateral incisions entirely through the lamella of tissue which separates the posterior from the two lateral lobes. If these incisions are not made deep enough, the enucleating finger or instrument will infringe on the proximal surface of the lamella and the enucleating instrument will be lead to the lateral capsule of the prostate, where great damage will be done if force is used, because of the fact that the capsule contains many large bloodvessels which, if ruptured, may add materially to the hemorrhage resulting from the operation.

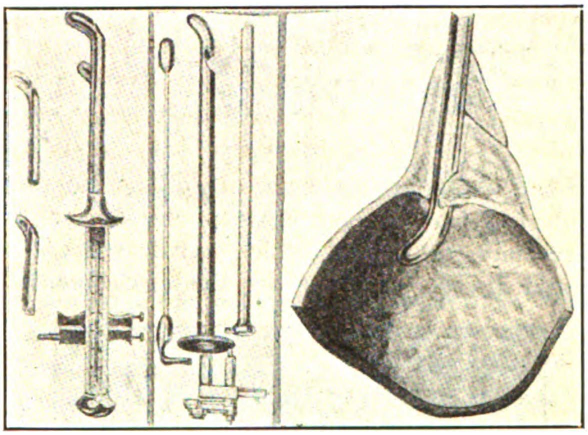


Fig. II. Young's Instrument in Operation (Randall).

The enlarged middle and lateral portions of the prostate are removed through the two lateral incisions leaving the ejaculatory ducts unbound in the bridge of tissue between the two incisions. The cavities are easily and effectually packed with gauze and this may help materially to diminish hemorrhage. There is only one objection to perineal prostatectomy and that is that there must be an especial effort made to examine for and remove any enlarged subcervical group at the vesical orifice. Sometimes the removal of this structure is very difficult and I have seen three cases where it was necessary to perform suprapubic cystotomy in order to accomplish this.

The perineal prostatectomy is more difficult to perform, requires somewhat complete knowledge of the anatomy of the perineum and great care in observing the points just set forth. It has the advantage of an operation performed under sight, an opportunity to pack thoroughly the cavities from which the enlarged lobes of the prostate have been removed, and very much better drainage.

In the suprapubic operation the intraurethral enucleation follows more closely the anatomical structures involved than does the procedure recommended by Freyer, viz, making an incision into the most prominent part of the gland and commencing the enucleation at that point. In the intraurethral method which simply consists in introducing the finger into the urethra, which usually splits in a ventral direction, and carrying the enucleation laterally in both directions commencing at the top of the involved structure on either side until it is entirely free. This removes the lateral and middle lobes and the subcervical group all in one mass and does not damage the sphincteric ring as happens in the procedure of Freyer.

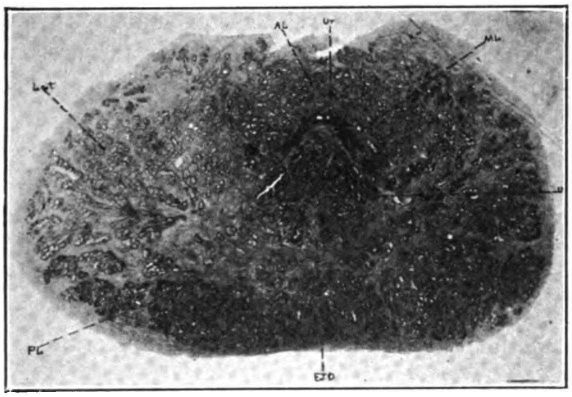


Fig. III. Cross section through the level of the upper end of verumontanum in a boy 17 yrs. UR. Urethra. ML. Middle lobe tubules. Lat. Lateral lobe tubules. PL. Post. lobe. tubules showing above a fairly well marked partition between lat. and post. lobes. AL. Anterior lobe tubules. UTR. Utriculus prostaticus. EJD. Ejaculatory ducts.

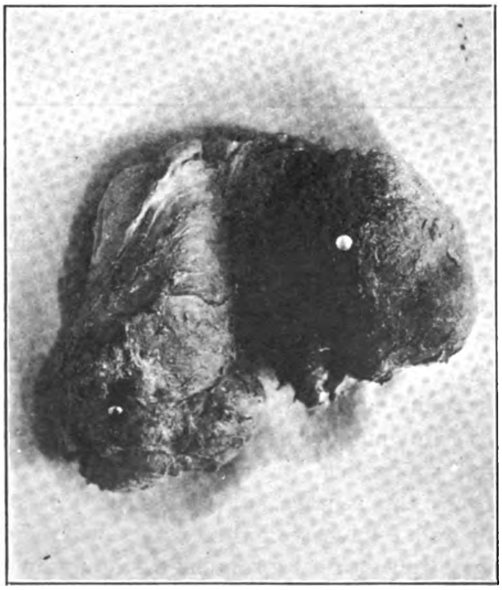


Fig. IV. Enlarged prostate removed in Oct., 1916. Patient died from uraemia 10 days later.

I have examined a great many specimens removed by the suprapubic route and find that practically all of them have carried away with them the very uppermost portion of the verumontanum down to but never including the ejaculatory ducts. The reason for this is that the ejaculatory ducts are imbedded in the lamella of tissues separating the posterior lobe from the rest of the prostate and hence cannot be removed without a special cutting operation done with this particular purpose in view.

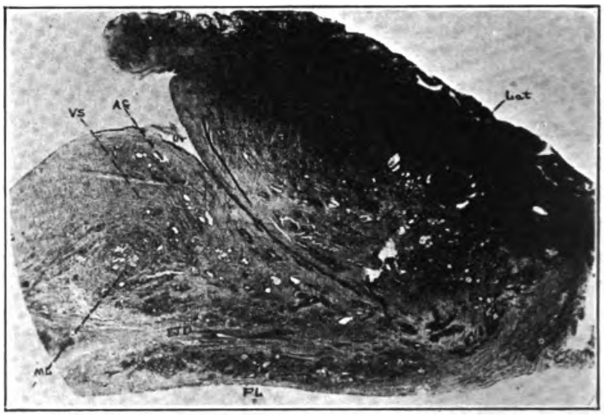


Fig. V. Oblique section through the prostate and trigonal region of a man aged 76 years. UR., Urethra. AG. Subcervical gland tubules. VS., Vesical sphincter. ML. Middle lobe tubules. EJD. Ejaculatory ducts and muscular envelope. PL. Posterior lobe tubules. Lat. Lateral lobe tubules.

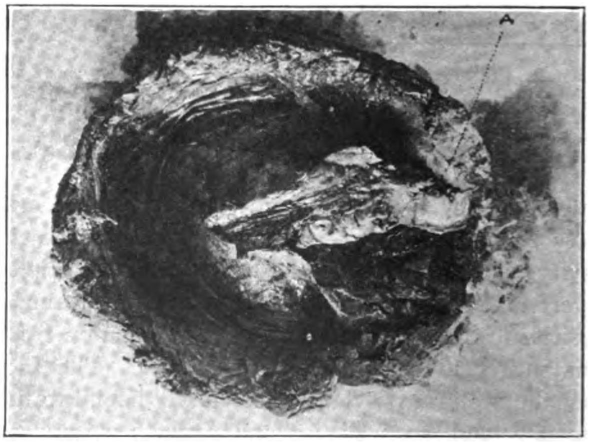


Fig. VI. Cavity from which accompanying prostate was removed showing remarkable manner in which the cavity reduces in size due to the contractility of the prostatic capsule.

The disadvantages by the suprapubic operation done by any method are: the poor uphill drainage; the fact that it is a blind operation; and the greater hemorrhage due to the necessary laceration of the very vascular trigonum and vesical orifice and the difficulty in properly packing the prostatic cavity. Following the suggestion of David W. MacKenzie, of Magill University, before closing up the incision in the bladder after the suprapubic operation I always put the patient in Trendelenburg position and with wide retraction examine the bed of the prostate and clamp and ligate any bleeding vessels observed. Hemorrhage is very much less and the loss of a patient from that cause is almost impossible because any severe bleeding can be curbed at once.

The advantages of the suprapubic operation are the simplicity of the procedure and the rapidity with which the operation can be performed.

The subcervical group of tubules occupies an extremely strategic position within the sphincter on the floor of the vesical orifice. As its size increases, with accompanying evils, the obstructions become marked and should be removed. A great many procedures have been recommended. I have found that Young's punch operation is decidedly the best method employed in removing these intrasphincteric masses, be they very small, large, unilobular, or trilobular. The instrument is introduced so that the window is in the posterior urethra. The obdurator is withdrawn and the instrument inserted still further until the tumor at the vesical orifice rises into the fenestra completely filling it. The cutting inner tube is then introduced and quickly pushed into position, punching out the entire portion of the tumor in the fenestra. The instrument is then turned obliquely to the right and then to the left, where the same procedure is repeated. It is then withdrawn and a catheter with a large fenestra is introduced. It is wise to keep a small amount of fluid in the bladder continually, but the former practice of keeping up the continuous irrigation has been given up, as it seemed to delay the clotting of the blood at the cut surfaces and hence delayed the healing. As a rule the bleeding stops after a few hours and the catheter can often be removed after 24 or 36 hours.

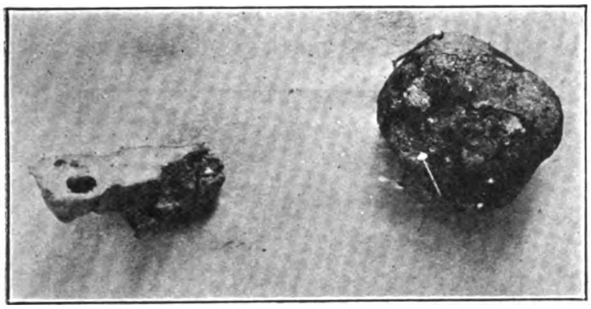


Fig. VII. Moderate enlargement of the subcervical group and a large stone formed in the bladder from the resulting retention. Removed by the author in March, 1916.

An enlargement of the subcervical group is of such frequent occurrence that digital examination should always be made when a patient is operated upon for enlargement of the prostate by the perineal route. A patient recently came to me with 14 ounces residual urine one year after perineal prostatectomy. He was able to void about 6 ounces of urine and was obliged to pass his urine every hour and a half during the night as well as during the day. The act of micturition was an extremely painful process and consisted of a forceless dribble. Cystoscopic examination demonstrated an enlargement of the subcervical group which had been left behind. Young's punch operation was performed with 4 per cent novocain. After the usual amount of hemorrhage had ceased the tube was removed and the patient's convalescence was rapid and uneventful. The result, six months after operation is very satisfactory. The patient is now able to void a forceful stream without pain or hesitancy, rarely has to get up at night to urinate and has less than one ounce of residual urine. This particular case typifies many others that have come under my observation and teaches that no prostatectomy is well done unless one searches for a subcervical gland enlargement at the time of operation.

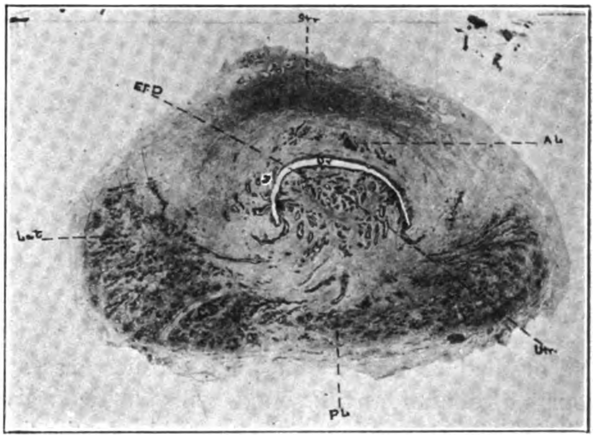


Fig. VIII.

Suprapubic prostatectomy as practiced by Squier will remove the subcervical group of glands in the natural course of the operation.

The same influences which cause the subcervical gland to enlarge apparently cause prostatic hypertrophy later on, so the punch operation may need to be followed years after by a prostatectomy. It seems advisable, however, to do this operation on every case which presents symptoms and has any considerable amount of residual urine.

These tumors have been treated by Bugbee, Stevens and others by the high frequency current. Chetwood's modification of the Bettini operation is also preferred by some operators. The reason why the Young punch operation seems to be the one of choice in this condition is that the entire tumor is removed at one time without injury to the internal sphincter and without general anesthesia.

Hypertrophic changes in the musculature of the trigonum vesicae, as it passes over the floor of the vesical orifice, is best treated by Young's punch or Chetwood's electro-cautery method. The high frequency spark is of very doubtful benefit, as the resulting scar would be nearly as hard to deal with as the original condition. In some of these cases a course of dilatation with sounds will sometimes give relief. The reason for this is twofold. In the first place the hypertrophy often occurs because of stricture of the urethra and the passage of sounds relieves the causative element. Second, there is a great amount of inflammatory tissue present as a rule which is largely dispelled by the passage of sounds. Often the action can be hastened by digital massage by rectum in the region of the vesical orifice with the sound in the urethra.

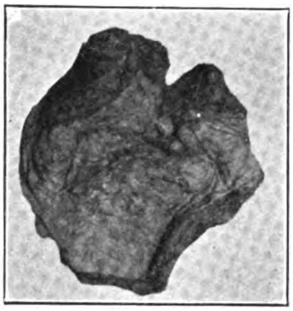


Fig. IX. Hypertrophy of subcervical group in three distinct portions which practically block the urethra.

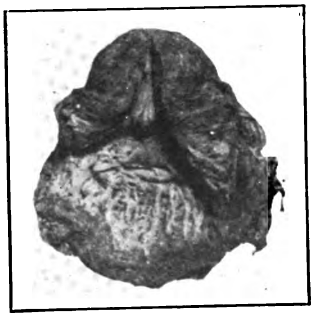


Fig. X. Trilobe enlargement of subcervical group which marked signs of obstruction.

Tumors of the subtrigonal group if not too large may be removed by Young's intravesicular rongeur. This is an exceedingly valuable instrument, but it must be used with care and intelligence, as it is so powerful that if used recklessly there is a possibility of lacerating the vesical wall. It has the advantage of sufficient strength and size to enable the operator to excise a large tumor without the use of a general anesthetic. Buerger's operating cystoscope can be utilized if the tumor is very small. High frequency has a distinct value in some of these cases, especially if the tumor is pedunculated. If the growth is large and sessile it is sometimes necessary, as it was in one case that I saw in Young's clinic, to perform a cystotomy and excise the mass with a scalpel.

Cases of fibrous stricture of the vesical orifice are treated best by Chetwood's electro-cautery and Young's punch. Were it not for the fact that an anesthetic is required for the former it would be decidedly the operation of choice. I have in my series a case treated by Chetwood's method with a perfect result. The criticism that there is danger of burning into the rectum is not justified, since the distance from the vesical orifice through the prostate to its posterior surface is in all of my specimens an inch or more. This operation burns through the internal sphincter and, in healing, it apparently does not permit that structure to resume its physiological action. Incontinence does not occur, however, if the external sphincter is not injured in performing the external urethrotomy to introduce the instrument. Young's punch is used in these cases, but is not quite so radical and must be followed by the passage of sounds occasionally.

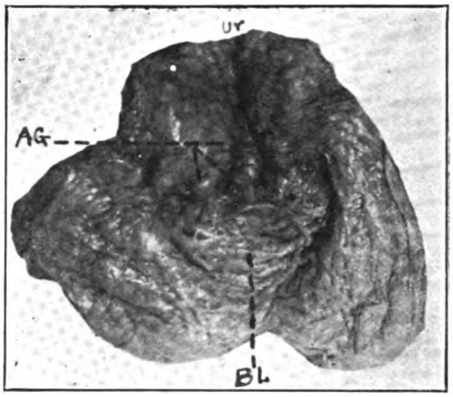


Fig. XI. Specimen showing marked hypertrophy of subcervical group in three distinct portions which are very large and almost completely block the urethra. BL. Fundus of bladder showing marked signs of obstruction. AG. Subcervical glands divided into three portions. UR. Urethra at apex of prostate.

Cysts at the vesical orifice are best treated by the high frequency current. One application of the spark is usually all that is required to eradicate the delicate wall. The Buerger operating instrument in a McCarthy cysto-urethroscope can also be used successfully in this condition. Often cysts in this region arise from a portion of the subcervical group in which case the remainder of the enlargement must be treated as well, although the cystic portion is usually the cause of the major portion of the obstructing mass.

Conclusions.—(1) An understanding of the embryology and morphology of the prostate is essential for its prosper surgical treatment by any method.

(a) In Young's perineal operation it is essential to make the incision entirely through the posterior lobe into the lateral lobe cavities before beginning the enucleation, otherwise the instrument will be led into the capsule of the gland and proper separation cannot be accomplished.

(b) The intraurethral suprapubic type of operation is preferable to the method advocated by Freyer on account of the fact that in the former there is less derangement of the anatomical structure.

(2) The posterior lobe of the prostate is never removed by either the Young's perineal method or by the suprapubic route.

(3) The ejaculatory ducts in practically every instance are not removed in a prostatectomy on account of the fact that they are firmly attached to the lamella of connective tissue which separates the posterior lobe from the rest of the prostate. In the suprapubic operation the upper portion of the verumontanum is usually torn way down to the point of entrance of the ejaculatory ducts, but on account of their structural qualities the orifices themselves are usually uninjured.

(4) The comparatively late and high infection of the rectum in carcinoma of the prostate is due to the presence of the fascia of Denonvilliers and the intravesicular fascia.

(5) The subcervical group enlargements are of frequent occurrence and of great importance on account of the strategic position which they occupy. Excision is best done by Young's punch or a suprapubic cystotomy, although the high frequency current and Chetwood's galvano-cautery method are advocated by some adherents.

LITERATURE.

Albarran: Maladies de la prostate; p. 526, 1902.

Ciechanowski, S.: Anatomical researches on the so-called prostatic hypertrophy; p. 73, 1903.

Cruvelhier: J. Anat. Path. du Corps Humain, livr. 17; p. 3.

Delbet: Traité historique et dogmatique de l'operation de la Taile, Paris, 1796, vol. 1, pp. 39-40.

Denonvilliers: Propositions et Observations d'anatomie, de physiol. et de path. Thèse de Paris, 1857.

Dupuytren: Mémoire sur l'operation de la Pierre, Paris, 1836, p. 21.

Ellis: Trans. Med. Chir. Soc., vol. 39, pp. 330-331.

Evatt: Jour. of Anat. and Physiology, vol. 43, p. 314, 1908.

von Frisch: Die Krankheiten der Prostata, 1910.

Griffiths: Jour. of Anat. and Physiol., vol. 23, p. 374, 1889; Jour. of Anat. and Physiol., vol. 23, p. 535, 1891.

Gross: Diseases of the bladder, etc., Phila., 1855, 2nd ed., p. 69.

Guyon: Uber die pathologische Anatomie und Physiologie der Retentio urinae. Zentralblatt fur die Kranheiten der Harm und sexual Organe, 1890.

Hodgson: The Prostate gland and its enlargement in old age, London, 1856.

Hunter: A Treatise on venereal diseases, London, 1788, p. 170.

Hansfield Jones: Med. Gazette, London, August, 1847.

Keidel-Mall: Human Embryology, Phila., vol. 1, 1910, pp. 180-200.

Lowsley: The Development of the Human Prostate Gland, Amer. Jour. Anat. vol. 13, No. 3, July, 1912.

The Human Prostate Gland at Birth. Jour. Amer. Med. Assoc., Jan. 11, 1913, vol. 60, pp. 110-114.

Congenital malformation of the posterior Urethra. Annals of Surg., Dec., 1914.

The Gross Anatomy of the Prostate Gland, Surg. Gynec. & Obstet., Feb., 1915, pp. 183-192.

McMurrich: The Development of the Human Body, Phila., 1902.

Morgagni: De Sedibus et Causis Morborum per Anatomen indagatis, Venis, 1761; Letter 41, Article 18.

Pallin: Archiv. für Anat. und Physiol., 1901.

Porosz: Daten zur Anatomie der Prostate. Archiv f. Anat. u. Physiol. Anat; Leipzig, 1913, suppl., 172.

Richardson: Development and Anatomy of the Prostate Gland, 1904.

Senn: Traite d'Anatomie chirurgicale, Paris, 1838, vol. 2, p. 329.

Tandler and Zuckerkandl: Folio Urologica Internationales-Archiv. für die Krankheiten der Harnogane, March, 1911.

Thomson: Diseases of the Prostate, 1873.

Versari: Ric d. Roma, vol. 13, 1907.

Walker: Jour. of Anat. and Physiol., vol. 40, p. 190.

Wilson and McGrath: Surgical Pathology of the Prostate, Surg. Gyn. & Obst., Dec., 1911, p. 647.

Non-removal of the Pectoral Muscle in Breast Cancer

There are certain occasions when one is tempted to do the incomplete operation, particularly in cases of early cancer possibly demonstrable only by exploratory incision or by means of a frozen section, when the cancer is small, movable and situated some distance from the pectoral fascia, when there is no appreciable involvement of the axillary lymph nodes, and particularly upon the urgent request of the patient who dreads the mutilation of a breast amputation. In spite of what has been known for years concerning the involvement of the pectoral muscle, and the high mortality which attends metastasis to this situation, a few surgeons spare the muscle because they fear edema and loss of motion of the arm. That this is an unnecessary dread is appreciated by those who follow the technic of the modern operations such as is described by Dr. W. L. Rodman. I have never seen permanent edema of the arm develop after this operation, and the amount of motion of the arm has always been satisfactory. —John Speese in *The Pennsylvania Medical Journal.*

CHOLECYSTECTOMY: INDICATIONS AND TECHNIQUE.

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Indications.—Cholecystectomy is indicated in all diseases of the gall-bladder, whether causing mild or severe symptoms. The operation is not done for the purpose of removing stones, for these may or may not be present, but for the purpose of removing tissue diseased as a result of progressive inflammation. Whether gall stones are present or not is immaterial for they are but one of the ways in which an already existant inflammation expresses itself.

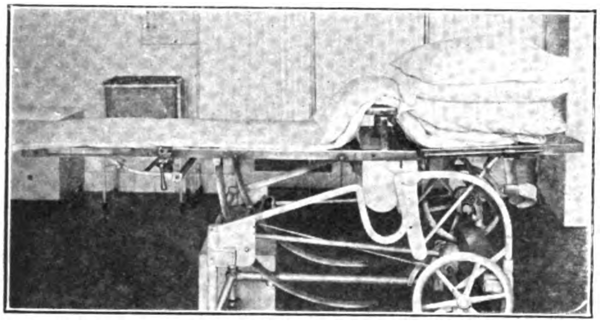

Fig. 1. Author's table prepared for operation on gall-bladder.

Aschoff believes that pure cholesterin stones can be formed without any symptoms whatever. Such stones are called latent or innocent. Personally I believe there is no such thing as innocent gall stones, but that they are the product of inflammation; that a gall-bladder once infected is always infected, and such a gall-bladder may become at any time a source of real danger to the patient through either the acute exacerbation of the inflammation or a change to carcinoma during middle or later life. In the latter connection are to be noted the operations upon carcinomatous gall-bladder, proven microscopically, occurring only in association with chronic cholecystitis, in which the operation has been performed a few months too late to be of value to the patient, the disease having already extended beyond the gall-bladder and involved the liver.

Whenever possible cholecystectomy should be performed early not only for the reasons stated, but also because inflammations of the gall-bladder are for the most part, probably always *recurrent and progressive* and if the inflammation is allowed to follow its natural trend at the very least there results adhesions which in their turn produce annoying and in many instances disabling symptoms. Early cholecystectomy is therefore advised whether the symptoms produced are mild or otherwise. So many operations have been performed on the terminal pathology of this condition with an attendant high mortality and disability from already existing complications that it is time for early operation to be advocated, because early operation at a time when the disease is *limited to the gall-bladder* means at the very least the saving of much discomfort and inefficiency later in life. At all events, the patient should be given an opportunity to choose the early stages of the disease whether he wishes to continue to be subject to recurring attacks of so-called indigestion with the added dangers of acute inflammation and the final danger of carcinomatous change.

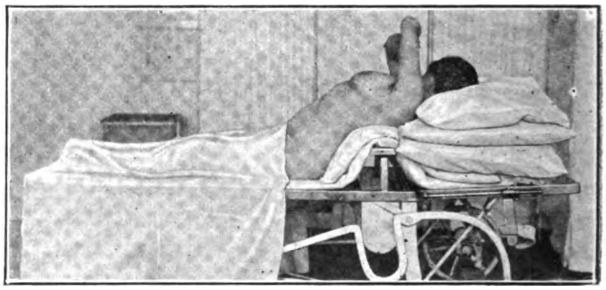

Fig. 2. Position for gall-bladder operation.

Medical measures with the idea of causing the passage of the stones are very ill-advised; fortunately, they are not apt to be successful. If stones do pass they can but serve to cause an extension of the disease beyond the gall-bladder. Formerly the high mortality of operations in this region was thought to be a bar to operative interference except in advanced cases; it is these very cases which are responsible for the high mortality; the disease should not be allowed to progress to this point. The lesion is initiated in the gall-bladder and early removal of the gall-bladder will prevent the complications above stated, and also will be attended with an extremely low mortality. This mortality should be no higher than that attendant upon operations for chronic appendicitis. Personally I have never had a death from an operation upon the gall-bladder where the disease was limited to the gall-bladder itself. The cases that have succumbed have been those in which carcinoma was present or in which the disease had extended to the common and hepatic ducts or in which there was gangrenous inflammation and perforation.

At the operating table there are certain cases in which the indication for operative attack upon the gall-bladder can be determined only by one who has had extensive experience in this department of surgery. This does not refer to those gall-bladders presenting indubitable evidences of inflammation such as may be recognized by all. Such inflamed gall-bladders should be removed. It is also to be noted that it is not sufficient to remove the gall-bladder, but that exploration of the ducts is imperative if one wishes to be free from the annoyance of so-called recurrences. When the common duct has once been infected by inflammation there is always the possibility that further stones will form. Three times I have opened the common duct of the same patient at intervals of one and four years and removed a stone. I do not believe that I overlooked a stone at any one of these times, but that a stone had been formed between the operations, this due to the diseased condition of the duct itself. Other times I have opened a duct a second time after a primary exploration had failed to disclose a stone and found one. This further strengthens the position that the disease should be attacked while still limited to the gall-bladder. In exploring the common duct it is not sufficient to pass a probe through it through the stump of the widened cystic duct. The duct must be opened. Several times after passing a probe freely into the duodenum I have at the same operation opened the duct and found several small stones. In one instance, after most thorough exploration, stones, evidently from the hepatic ducts, came out through the wound several days later.

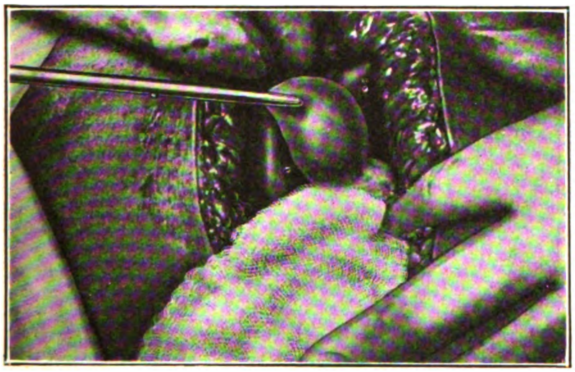

Fig. 3. The position renders the gall-bladder and ducts readily accessible.

In addition to the marked evidences of inflammation there are certain diagnostic signs which can be relied upon even when the gall-bladder itself looks normal. There are the enlargement of the gland in relation with the cystic duct, enlarged glands at the base of the liver and enlarged glands along the common duct itself, including those glands in the pancreas at the termination of the common duct in the duodenal wall. When only the gland in relation with the cystic duct is enlarged it may usually be relied upon that the disease has not extended beyond the gall-bladder itself and when this gland is found enlarged cholecystectomy is indicated even if the external appearance of the gall-bladder is apparently normal.

The enlargement of the other glands mentioned is further corroboration of gall-bladder disease, but also may indicate that the disease has progressed beyond the gall-bladder, though not necessarily the latter.

Adhesions, however slight, of the gall-bladder to the duodenum or to the colon or to the stomach, are indications of cholecystectomy. This paper is not dealing with symptoms, but it may be noted in passing that often slight adhesions between the cystic duct, the infundibulum of the gall-bladder and duodenum in the absence of stone have been observed to produce as agonizing symptoms as if stone were present.

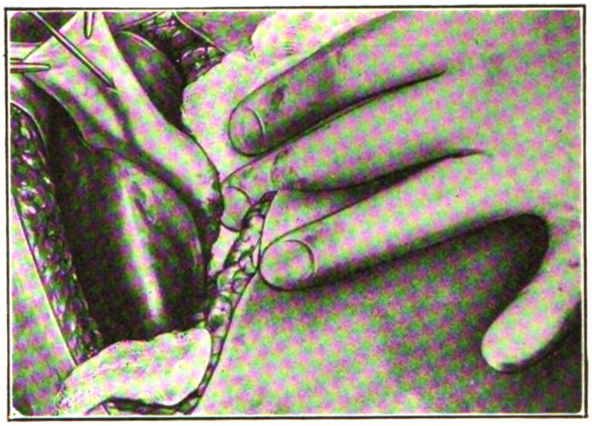

Fig. 4. Evacuating the gall-bladder contents.

In palpating a gall-bladder in which disease is suspected it may be that it will be found tense, distended and apparently without stones. It is inadvisable to press such a gall-bladder with the idea of expressing its contents through the cystic duct, for by so doing small stones may be forced into the common and hepatic ducts. It is much better to introduce an aspirating needle attached to a suction apparatus and withdraw the fluid. Many times by so doing stones have been discovered or a thickening of the gall-bladder wall which it was impossible to discover by palpation in the distended state of the viscus.

In such cases (distended gall-bladders) if the clinical symptoms point to gall-bladder disease it is not sufficient to palpate through an incision at a distance from the gall-bladder, but it must itself be exposed and viewed as well as palpated, and if necessary aspirated.

The aspirated contents of the gall-bladder are of positive but not of negative value in determining whether the viscus is diseased. Normal bile is thin and amber-colored. Any deviation from this is suggestive of an infected gall-bladder or interference with proper drainage or both. As examples of the latter may be cited dirty looking bile and tarry bile. If interference with drainage exists, either through incomplete obstruction of the cystic duct or through impairment of the musculature of the gall-bladder wall by inflammatory infiltration, making it impossible for the viscus to empty readily, there results a stringiness or excessive stickiness of the aspirated bile due to an excess of mucus produced by irritation through infection of the mucous glands. In case of complete blockage of the cystic duct of long standing very thick glairy mucus is present; when the blockage is of very long standing the fluid will be watery and limpid or milky. At times masses of cholesterin crystals visible to the naked eye, but not large enough to be dignified by the name of stone, are seen in bile long contained in the gall-bladder.

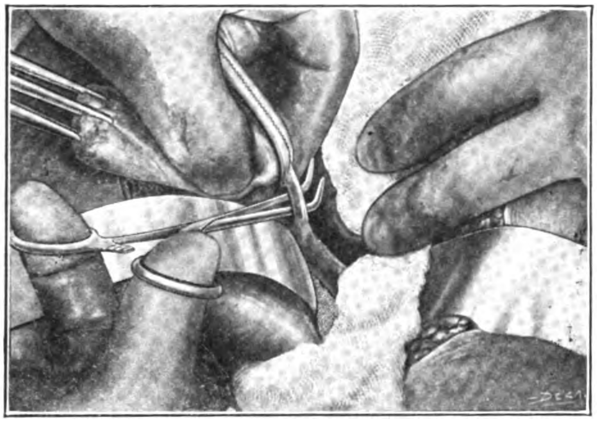

Fig. 5. Isolating the cystic duct.

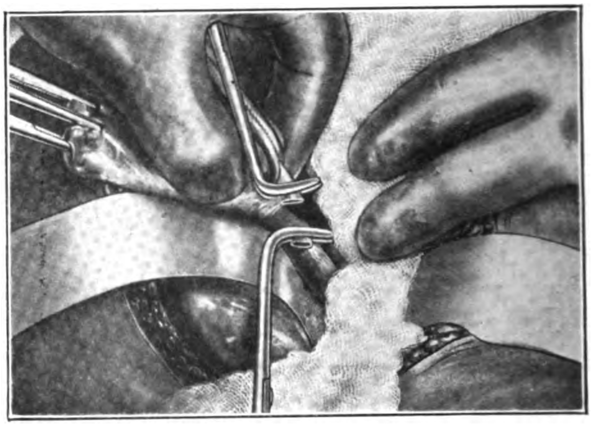

Fig. 6. Section ot the cystic duct.

In acute complete blockage the fluid is inflammatory, purulent or bloody; the first portion of the aspiration may look somewhat like normal bile, but as the more dependent part is withdrawn it will prove cloudy, bloody or purulent, with more or less detritus.

Technic.—Cholecystectomy should be just as formal an operation as hysterectomy or thyroidectomy.

The technique which is here described has been employed by me for a number of years and in a sufficient number of cases of all degrees of pathological change to satisfy me of its adequacy. No originality is claimed. The method is the logical result of a practical study of the anatomical and pathological conditions present in gall-bladder disease. The basis of each illustration has been selected from moving-picture film.

Anesthesia.—When operating upon these cases I often state that 50 per cent of the success of the operation is due to the anesthesia, 40 per cent to the position, 9 per cent to the assistants and the remainder to the operator. This is done to emphasize the value of proper anesthesia and proper position. The anesthetic which has been found the most valuable in my experience in these cases has been preliminary medication of morphine sulphate gr. 1/4, atropine gr. 1/150, forty minutes before the time set for operation. In nervous patients two drams of paraldehyde and two drams of potassium bromide are administered in four ounces of water per rectum on the evening preceding the morning of operation. The anesthesia itself is initiated by ether, drop method, with an open mask; as soon as the patient is under, warm ether-oxygen-vapor (Gwathmey apparatus) is substituted, using a nasal tube. The patient is placed in position for the operation before the anesthesia is begun.

Position of the patient (Figs. 1 and 2).—To render the parts to be subjected to operative attack *readily* accessible it is essential that the chest and shoulders of the patient be upon a higher plane than the abdomen. This is accomplished by elevating the upper portion of the patient from the shoulders to the level of the ensiform to a height of four to six inches. This may be accomplished by a special framework or by air cushions, or preferably by an elevator attachment on the table in conjunction with ordinary soft pillows. No complaint of backache has been made in patients so elevated.

Incision.—The ideal incision is one which will give adequate exposure of the parts involved to be operated and which will also afford opportunity for appendicectomy and for posterior gastroenterostomy should duodenal ulcer complicate the gall-bladder lesion. Such an incision begins midway between the ensiform and the tip of the ninth rib just below the rib border. It parallels the border of the ribs until the region of the tip of the ninth rib is reached and then curves directly downward over the outer third of the rectus muscle. This skin incision is carried down to the fascia of the external oblique, which is incised in the same direction; the incision is then deepened through the rectus muscle, the epigastric part of the incision being carried half way across the fibers of the rectus and then splitting the muscle in an upward direction. The internal oblique aponeurosis, transversalis muscle and peritoneum are incised in the same direction for the full extent of the incision, care being taken in extending this incison downward through these structures to avoid injury to the tenth intercostal nerve. This nerve is easily raised from its bed and retracted out of the way. By retracting the lower part of this incision downward the appendix can usually be readily removed.

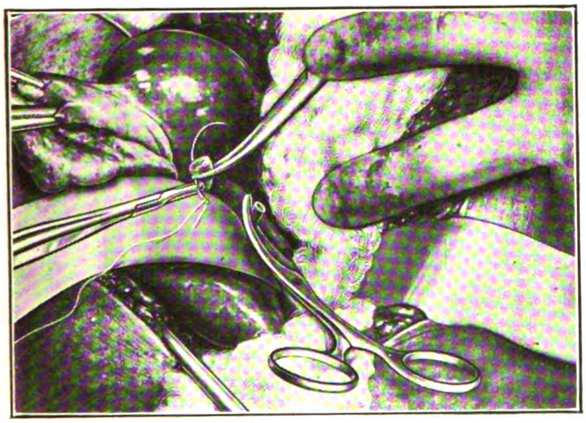

Fig. 7. Securing the cystic artery.

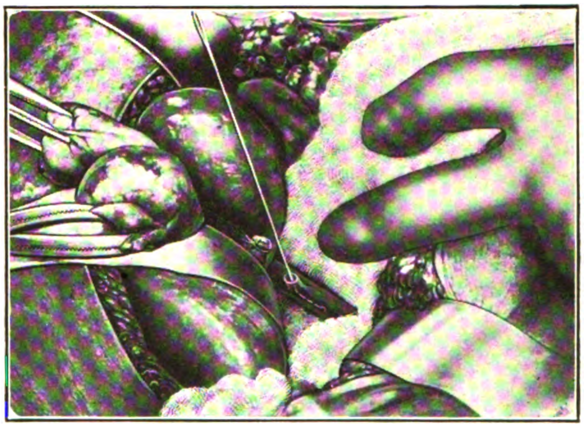

Fig. 8. Probing the common duct.

Preliminary exploration of the peritoneal cavity.—A general manual and, as far as practical, visual survey of the peritoneal contents is practiced and extraneous lesions and anomalies noted. The appendix is removed. All the above is omitted in cases in which infection is present and one proceeds directly to the

Intraperitoneal isolation of the field of operation.—Proper preparation of the patient, proper anesthesia and proper position renders the intraperitoneal isolation of the field of operation simple. Slight manipulation causes the lower edge of the liver and the gall-bladder to protrude into the wound (Fig. 3). The outer upper portion of the incision (the rib border over the liver) is retracted (Fig. 4). A gauze pad protects the outer lip of the incision. The upper part of the inner lip of the wound is retracted. Here also the wound is protected by a flat gauze pad. This retraction allows the stomach to bulge forward. Retraction at this point should not be forcible or difficulty may be experienced in controlling the stomach. Forcible retraction, if needed at all, is practiced on the rib border.

A pad is introduced to hold back the stomach (Fig. 4).

A pad is introduced to hold back the colon (Fig. 4).

If adhesions to the colon are present these are sectioned between clamps and ligated before introducing the colon pad.

The next step has to do with the gall-bladder itself. The contents are evacuated by a large aspirating needle and a vacuum apparatus (Fig. 4) and then grasped by clamps (the variety of clamp depending on the friability of the gall-bladder wall). If the gall-bladder is neither tense nor friable it is first grasped by clamps, drawn partially up and then evacuated. In either event the surrounding parts are protected by possible contamination by a yard square of loose moist gauze.

On withdrawing the suction needle the opening caused by its entrance is sealed by a forceps appropriate to the tissues to be grasped.

Further traction is made on the gall-bladder (Fig. 5) to bring it well up into and in many instances outside the incision. The tension exerted must be in relation to the strength of the gall-bladder tissues. It is aided when these tissues are friable by gentle manipulation and by pushing back the surrounding parts by means of the gauze already introduced.

A flexible metal retractor properly molded to fit the individual case is introduced at the middle third of the inner wound lip to retract the duodenum (Fig. 5). The lower edge of the retractor must not press on the tissues. This retractor puts the ligamentum-hepatico-duodenale upon the stretch and in connection with the tension exerted on the gall-bladder serves to expose all the parts involved in the operation except the cystic duct, which is overlain by the ampulla of the gall-bladder.

The lesser cavity of the peritoneum is protected by packing the foramen of Winslow with moist gauze (Fig. 5).

The ampulla of the gall-bladder is seized by right-angled forceps and drawn upward (Fig. 5), exposing the upper portion of the cystic duct, which is covered by peritoneum and fat thickened in proportion to the degree of inflammation present (Fig. 5). This also gives good exposure of the gland which lies to the liver side of the cystic duct and which *when enlarged is always a diagnostic sign of gall-bladder disease, whether the gall-bladder appears externally to be diseased or not.*

The cystic duct is isolated by carefully scratching through the fat and peritoneum surrounding it with a right-angled clamp. Care must be taken *not to go too low down* on the duct. The duct arises from the liver side of the gall-bladder, not from the ampulla. If this is not remembered the common duct may be injured. The cystic duct is isolated without taking with it the cystic artery; rarely this is impossible. Usually a dissection can be made.

The right-angle clamp is used to make a little window (Fig. 5) to the liver side of the cystic duct and enough space is so created to grasp the duct below, *not* close to the common duct, by the same clamp (Fig. 6).

A second right-angled clamp now secures the duct sufficiently above the first to allow of section between the two (Fig. 6).

The cystic duct is sectioned between these clamps (Fig. 6). The right-angled clamp on the ampulla is removed, the one on the upper portion of the cystic duct making the traction necessary for exposure. Traction on the upper clamp with *slight* pressure downward with a stick sponge exposes the cystic artery which can at times be seen, but in any event can be secured by grasping the tissues forming the liver bed of the gall-bladder with a right-angled clamp at a *right angle* to the liver opposite the *upper* portion of the ampulla (Fig. 7). To grasp the artery in any other direction is dangerous, as the right hepatic duct, if anomalous, or even the right hepatic artery, may easily be injured. The tissues which contain the cystic artery must not be grasped at a lower but at a higher level than the point at which the cystic duct was sectioned and never in a direction toward the hepatic duct, but away from it.

These tissues are cut to the gall-bladder side of the clamp and the cystic duct end of the gall-bladder turned upward and the upper clamp on the cystic duct placed in the hands of the assistant who already has charge of the gall-bladder fundus and the retraction of the outer edge of the incision (Fig. 7). The gall-bladder is not removed until later. It serves a very useful purpose as a retractor in exposing the parts.

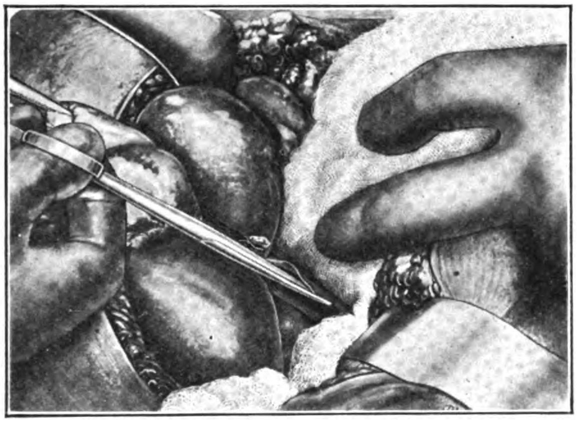

Fig. 9. Opening the common duct.

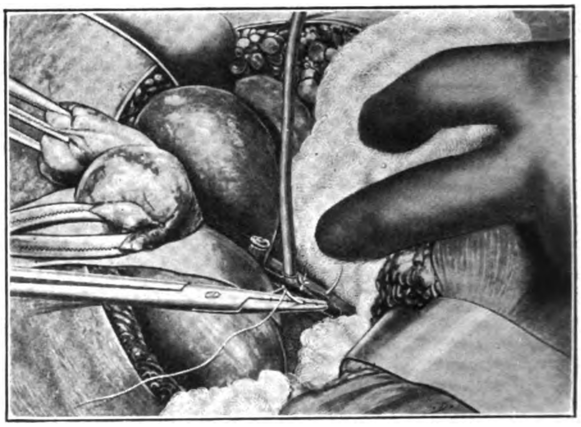

Fig. 10. Placing and securing T-tube in the common duct.

The cystic artery is ligated by needle-ligature (Fig. 7). The clamp is removed from the cystic duct and the size of the duct noted. *If* normal, and to be normal it must be very small indeed, and if there are no glands along the common duct and nothing to be felt or *seen* abnormal I am content to pass a very fine probe (Fig. 8) (and only a *very* fine probe will pass the *normal* duct) through it and the common duct into the duodenum. To pass into the common duct the probe must be bent as illustrated. If the duct is widened it should be split down to the common duct and the common duct also split (Fig. 9) sufficiently to allow of the passage of an appropriate-sized probe and sufficient visual exploration of the duct to insure its patency and freedom from stone or other obstruction.

To return to the normal cystic duct. The duct stump is seized in a forceps and a ligature applied at a little distance from the common duct, not sufficiently close to give rise to subsequent stricture of the common duct at that point. The distal portion is excised and the cut end crushed with forceps to destroy the lining.

A widened duct requires different treatment. The common duct having been incised and cleared of stones, the stump of the cystic duct is excised to within one-quarter of an inch of the common duct. A rubber T-tube of appropriate size is introduced into the common duct for temporary drainage (8 to 10 days) and the incision in the common duct closed by a few interrupted sutures up to the point where the T-tube emerges (Fig. 10). These sutures should not pierce the lumen of the duct.

If during the operation on the deeper parts accidental injury to the hepatic artery or an anomalous bloodvessel occurs (anomalies of the blood supply of the liver are fairly common) the ligamentum hepatico-duodenale can be gently grasped by a gastroenterostomy clamp and the entire blood supply of the parts be thus immediately brought under control. Careful bloodless dissection can then be made, the extent of the injury noted and proper repair made.

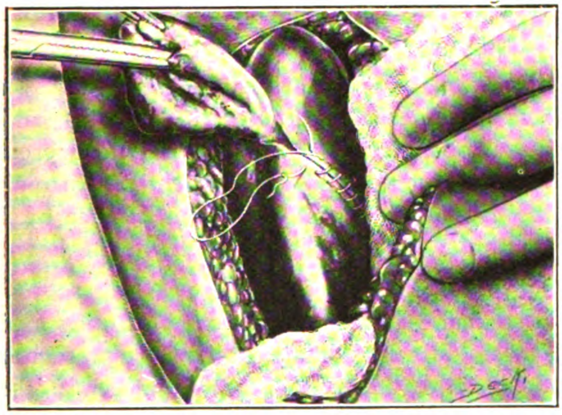
Fig. 11. Suturing over the raw surface of the liver.

The deeper work on the common duct being completed, the covering of the raw surface in the liver, the gall-bladder bed, *pari passu* with the further removal of the gall-bladder is proceeded with (Fig. 11). If the gall-bladder is carefully removed, in many cases surprisingly little raw surface is left. Usually the peritoneal attachments of the gall-bladder to the liver can be readily approximated. If it becomes necessary to pierce the liver substance care should be taken that softened catgut of a size which will fill the needle puncture be used and also a round needle. The suture is continuous and applied with only sufficient tension to control bleeding.

Finally a split tube-drain is led to the foramen of Winslow (a second one to the anterior surface of the ligamentum hepatico-duodenale if the common duct has been drained), the gauze and laparotomy pads are removed, the position of the patient leveled to reduce tension in suturing the wound, and the wound closed in layers.

301 DeKalb Ave.

LABYRINTHITIS AS A COMPLICATION OF MASTOIDITIS.*

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Labyrinthitis can develop and exist independently of mastoiditis; also mastoiditis without an apparent involvement of the labyrinth. In fact labyrinthitis is not a very frequent complication of acute mastoiditis, but more often of the chronic type where it makes the problem of mastoditis a much more serious one. Fortunately, in the great majority of the acute mastoid cases the infection has passed right on from the post-nasal space *via* the Eustachian tube, to the middle ear, to the antrum of the mastoid and to the mastoid cells, without apparently touching the labyrinth, which is particularly apt to be the case when there is no prolonged midde ear tension.

The more cases of otitis media that are relieved by an early paracentisis the less mastoiditis we see. This holds good also, but still more so, with respect to labyrinthitis. In the course of a mastoiditis we never know from the very beginning to the last day, or even after apparent complete recovery, that a labyrinthitis may not develop at any time. It therefore behooves us to be continuously on guard against this complication.

Labyrinthitis in connection with mastoiditis presents several points of special interest and great importance: In the first place as a labyrinthitis in any of the various forms or degrees. Second, on account of the possibility of infecting the contents of the cranial cavity by way of the avenues passing through the pyramid, for the endolymphatic space of the inner ear has a projection into the posterior fossa of the cranial cavity, called the ductus endolymphaticus, which forms a small pouch on the posterior aspect of the petrous portion, and any infection within this endolymphatic space can in this way easily be transmitted through this duct to the cerebellar fossa. There is another opening in the pyramid connecting the cranium with the inner ear, namely the internal meatus through which pass the acoustic and facial nerves with the concomitant bloodvessels and lymphatics, forming a possible channel for intra-cranial infection. The third interesting feature in regard to the labyrinth in mastoid disease is the function of the labyrinth, which function, or absence of such, greatly assists in the diagnosis and even the localization of intracranial complications. It is hardly necessary to discuss the question of etiology of labyrinthitis in the presence of mastoiditis beyond again emphasizing the fact that the chronic otitis media with the chronic mastoiditis, by means of their chronic and destructive tendency frequently produce an extension of this destruction into the labyrinth. But not always is the direct extension into the labyrinth the cause of labyrinthitis. There is such a thing as an infection through the blood- and the lymph-channels.

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* Read at the meeting of the Milwaukee Oto-Ophthalmic Club, March, 1917.

Diagnosis.—How do we know we are dealing with a labyrinthitis in addition to mastoiditis in a given case? Just as soon as there are dizziness or vertigo, nausea, disturbance of the equilibrium, otitic nystagmus, severe disturbances in, or absence of hearing—our suspicion must be at once aroused and a labyrinthitis or at least a labyrinth irritation must be suspected. It then remains for us to find out exactly what we are dealing with and to establish the particular kind of labyrinthine involvement and the degree of such. We have general rules that are of use in the diagnosis of these cases.

In the diagnosis of labyrinthitis it is of prime importance that we correctly interpret the symptoms presented by the patient and in addition employ the physiological tests of the labyrinth. Among the symptoms we find dizziness, vertigo, nausea, spontaneous otitic nystagmus and defective hearing practically always present to a greater or lesser degree and this *degree* helps us in our diagnosis to some extent.

The condition of the hearing and the direction of the spontaneous nystagmus, or of the physiologically induced nystagmus, are our strongest aids in making a differential diagnosis.

The direction of the nystagmus is always toward the side of the strongest stimulation.

Vestibular and cochlear tests must both be made in every case. We put the following rules for differential diagnosis:

1. With hearing fair and nystagmus to the diseased side we diagnose a labyrinth irritation or circumscribed or serous labyrinthitis. Serous labyrinthitis has one distinguishing point, namely the patient is deaf to the speaking voice but not to the tuning fork.

2. With the hearing *gone* and nystagmus to the *well* side we pronounce the condition one of purulent labyrinthitis. Some severe forms of serous labyrinthitis will also manifest these symptoms.

3. With the hearing gone and spontaneous nystagmus to the *diseased* side we suspect an intracranial complication, particularly so if the nystagmus has an increasing tendency and the Weber test points to the healthy side.

Of course these are not iron-bound rules and we must expect to meet with exceptions.

I have touched only upon the salient points, leaving out of consideration such important diagnostic aids as the *fistula* symptom and the pointing manifestations of Barañy.

Prevention.—Early paracentesis and gentle suction at the external meatus of the ear (instead of Politzer inflation, which is extremely dangerous) will not only prevent the development of mastoiditis in the great majority of cases, but oftener of the labyrinthitis, and it will also preserve the hearing power.

Treatment.—If in the acute cases of otitis media and mastoiditis, labyrinth symptoms are present and on the increase, the mastoid operation, even if otherwise not so urgent, should be done immediately and the wound left in condition for a secondary operation in case this operation does not relieve the labyrinth symptoms.

The treatment of labyrinthitis of any kind in the presence of mastoiditis is the treatment for mastoiditis, namely, mastoid operation, as carefully and quickly performed and with as little traumatism as possible—plus such measures as absolute rest in bed, sedatives, etc., watching for changes in the symptoms. If after twenty-four hours the symptoms become more manifest instead of subsiding, and the physiological reaction of the labyrinth becomes extinct, a secondary operation after the method of Neumann, which destroys and drains the labyrinth, must be considered. It is imperative to expose the dura of the posterior fossa in this operation, always carefully guarding the facial nerve against injury or exposure.

In closing I would warn against a too sanguine prognosis with regard to the hearing in mastoid operations, because a labyrinthitis as a possible complication will often entail permanent deafness in the operated ear; while as a rule we expect good hearing following the simple mastoid operation.

PRACTICAL LOCAL ANESTHESIA.*

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SAN DIEGO, CAL.

The title, "Practical Local Anesthesia," gives me excuse not to consider spinal anesthesia, paravertebral, and sacral blocking, all of which are practical in some hands, although for the average operator I do not consider them always so.

Infiltration anesthesia is the production of freedom from painful manipulation by saturating with the solution the tissues in the region to be operated upon; that is anesthetizing terminal nerve filaments.

Conduction anesthesia means the interruption of sensation by injecting the nerve that supplies the area to be operated, by putting the solution into the nerve substance, its sheath, or immediately surrounding it.

These two forms of injection anesthesia are quite different theoretically, but practically are similar and are both used in my work, in which, however, I rely most on infiltration.

To be successful the infiltration of tissue in the operative field requires a technic with many distinct features, but I have demonstrated to myself, other physicians and my patients that it is practical and only demands certain information, qualifications and close attention to all details to be satisfactorily done. This form of anesthesia eliminates the slight but certain risk of mortality that a general narcosis carries.

Farr, of Minneapolis, combines local anesthesia and narcotization with morphine and scopolamin, a "twilight sleep" affair that may be more desirable in some instances than either an inhalation anesthesia or plain local anesthesia.

Even though nitrous oxid-and-oxygen has gone far towards eliminating the horror of being put to sleep, most people regard any general or inhalation anesthesia with a degree of dread, therefore there is a ready field for painless surgery by the injection of solutions.

Not every patient is able to stand work under this method, nor does it mean hypnotism as some would have you think. A great many individuals have as much fear of knowing the surgery is being done as of being unconscious from an inhalation anesthesia. Many require the repeated assurance that the procedure will be painless, together with such drugs as morphine and scopolamin to take the "hypertension off the apprehension." In fact, I always give morphine 1/6 to 1/4 gr. and scopolamin 1/150 to 1/200 gr. one hour before starting to operate.

Another essential for surgery under local anesthesia is a definite knowledge of the regional anatomy and nerve supply and a knowledge of which structures require better infiltration. The skin needs much care, the subcuticular fat little, muscle a medium amount. This knowledge is hardly less important than gentleness and regard for the tissues.

The surgeon usually should be seated, perfectly at ease, and possessing the complete confidence of the patient both preceding and during the operation. Do not fail to tell the patient when you are going to stick him with the first needle, as this keeps his confidence and makes for a satisfactory mental attitude. As small a thing as this at the beginning may mean success or complete failure in carrying out a satisfactory procedure.

The manner of injecting the solution is important; keep the piston moving and make the solution slowly precede the needle point.

The patient must be made perfectly comfortable on the table, as it is most essential that he is not restless.

A fact to be well borne in mind is that the effect of the solution is not immediate and a little time and firm gentle pressure over the area are necessary before the tissues are insensible to pain. Anesthesia lasts from one to four hours, depending on location and method.

If syringes and needles are not the proper size and length, good results will not be secured. Also sharp cutting instruments are absolutely necessary. If tension or pressure is made in the use of improper instruments, pain is produced. However, I must state that tension and pressure are most difficult to overcome in local anesthesia work and they must be carefully avoided.

Novocaine, which is easily sterilized, is the ideal, effectual non-toxic drug used in practically all this work. Other drugs have been combined with it but are not necessary and had best be omitted. I use a solution of one-half per cent. novocaine and add eight minims of a fresh 1 to 1000 solution of adrenalin to the ounce at the time of use. The tablets of novocaine are satisfactory. The strength of both novocaine and adrenalin, especially the latter, is varied according to indications.

One finds few idiosyncrasies to novocaine and some use as much as 1 gm. (15 gr.) with no untoward results, though I rarely use more than 5 gr. in any major operation. There appears to result no inhibition of healing nor, apparently, does it make the area more susceptible to infection.

There are certain conditions when quinine and urea are satisfactory and more desirable than novocaine and its effects last longer, usually from 24 to 72 hours.

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* Read before the San Diego County Medical Society, April 9, 1917.

The field can be, and is, rendered nearly bloodless by the use of adrenalin, which also prolongs the anesthesia effect of the novocaine. Any vessel seen in the wound should be given an extra amount of the solution in its region before being clamped, as it carries a nerve that is always sensitive.

At the present time dentists, eye, ear, nose and throat specialists are doing their work painlessly with local anesthesia and so I maintain that most surgery can likewise be done.

Such conditions as inguinal hernia can be operated upon painlessly and without shock. Moreover, in dealing with the sac the patient at the request of the operator can fill the sac, which is sometimes of value.

Strangulated hernia in the aged demands local anesthesia, as all the time necessary can be spent testing the vitality of the gut, with no bad effects, whereas under general narcosis the saving of time is a great item in the welfare of the patient.

In practically all of my hernia work I have used local anesthesia to the entire satisfaction of myself and patients.

I have also had most satisfactory results in hemorrhoid work. Proper infiltration enables one to thoroughly dilate the sphincter with freedom from actual pain and the removal of the tumors is easily made painless.

In bad risks with the aged I have opened the abdomen under local anesthesia and where it did not seem satisfactory to complete the work in this way I have used a very small amount of ether, much less being required than under ordinary circumstances. This occurred in two cases quite recently in elderly women with ruptured appendices, where I expected only to drain, but upon opening the abdomen it seemed best to perform appendicectomy with drainage. With slight inhalation anesthesia while dealing with the inflamed appendix only, not enough to produce nausea and vomiting, both made remarkably rapid recoveries. Considering their age and poor physical condition, the bad effects of a longer general anesthesia and the usual vomiting, such an outcome might not have been the case.

I am becoming convinced that more abdominal surgery should be done as follows: First, give enough morphine and scopolamine to benumb psychically; second, inject the abdominal wall with novocaine to benumb physically; then if unable to complete the intra-abdominal work without pain, we have an ideal condition for the use of a small amount of nitrous oxid and oxygen, discontinuing it as soon as this part of the operation is finished, and completing the work under the nerve blocking. Many intra-abdominal conditions can be dealt with without pain. Thus, the gall-bladder, appendix and fundus uteri are insensible to cutting and pricking; but tension on the mesentery or its attachments is the part that causes pain, and by injecting mesentery, etc., these tissues may be painlessly dealt with.

I have found that local anesthesia can be used effectively in vaginal plastic operations also, except in perineorrhaphy, and then there is tension and pain only when the levator ani is pulled together, which could be overcome by sacral blocking, a procedure I do not think necessary, as the patients stand it with only slight complaint.

I have not had an opportunity to use local anesthesia in a Cesarean section as yet, but am anxious to do so, with all confidence of being successful if the patient is a good subject. Clarence Webster and others are performing a number in this way, entirely satisfactory to the mother's sense of pain endurance.

In summarizing, I would like to say that practical local anesthesia is adaptable to most surgery, but lends itself best to certain operations and certain individuals, and it should be used with these points well considered. Psychology is desirable and if you can hypnotize it is all right but not essential.

Proper instruments, perfect knowledge of anatomy, a preliminary hypnotic, gentleness, confidence in oneself, securing and retaining the confidence of the patient are all essential.

I would emphasize that the temperament and personality of the surgeon are of greater worth in surgery with local, than with a general anesthetic.

URINARY TUBERCULOSIS.

The finding of tubercle bacilli, accompanied by blood and pus cells, is the only absolute and unequivocal sign of tuberculosis of the kidney. The appearance of tubercle bacilli in the urine does not by any means necessarily indicate urinary tuberculosis. Orth has demonstrated that tubercle bacilli can pass through the healthy mucous membrane from the blood without causing any local lesion. Tubercle bacilli are frequently found in the urine of tuberculous patients whose urinary tract is innocent of any pathological lesion. The urine should be drawn off from each ureter under proper aseptic precautions, and examined first for tubercle bacilli, pus and blood, and secondly for the functional value of each kidney and for secondary nephritis. There should be no hesitancy in accepting this risk, for it has been found by actual practice that the danger of infection is far less than the disaster to be encountered if this examination is not made.—**Oliver Lyons** in *Colorado Medicine*.

NITROUS OXID-OXYGEN ANESTHESIA IN GENERAL SURGERY.

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The literature relating to nitrous oxid-oxygen anesthesia for the performance of minor surgical, dental and obstetrical procedures has become quite voluminous during the last few years; but there is a strange paucity of important contributions concerning this method of inducing anesthesia for major operations. However, it is well known that many surgeons now insist upon nitrous oxid-oxygen being used in their general surgical work.

The belief formerly prevailing that nitrous oxid could be safely employed only for minor surgical procedures requiring short administrations has been shown distinctly fallacious; certainly an anesthetic that may be continuously administered for four hours without producing injurious immediate or remote after-effects must be regarded as the safest known agent for that purpose. Such a statement could not be applied to any other agent for the induction of general anesthesia. And based upon my experience I have no hesitation in asserting that there are few contraindications to the employment of nitrous oxid-oxygen in general surgery; regardless of the length of its administration, the previous mental and physical status of the patient is restored within a few minutes after the gas is withdrawn. Furthermore, when administered by an expert nitrous oxid-oxygen has practically no limitations as a general anesthetic.

"The testimony of surgeons who have accustomed themselves to operate with nitrous oxid-oxygen—that their technique is rendered more accurate, that the patient's condition as regards immediate and end-results is immeasurably better, and that the margin of safety is so much wider as to permit of operative intervention in many cases formerly considered impossible risks—would indicate that nitrous oxid-oxygen will eventually supersede to a large extent the older anesthetics." (Miller.)

The advantage claimed by Miller for nitrous oxid-oxygen anesthesia consists in freedom from after-effects. Recovery is immediate; there is no irritation of the kidneys or the respiratory system; no fatty degeneration of organs; changes in the blood are transient. The resistance of the patient is not lowered; if infection be present his power is not wasted in fighting the after-effects of the anesthetic, but is ready to combat the poison; in fact, soon after the inhaler has been removed from the patient's face all effects of the anesthetic are dissipated.

Casto found there was a tendency for the blood pressure to rise, but only when cyanosis appeared; hemoglobin was reduced, the blood index returning to normal after gas had been discontinued for twenty or thirty minutes. The coagulation time of the blood was decreased on the average more than one minute, returning to normal about twenty minutes after discontinuance of the gas. "A surgical clinic which does not employ gas anesthesia, from the standpoint of anesthetics, is a poorly conducted clinic." (Bevan.)

Twenty-one deaths under nitrous oxid-oxygen anesthesia have been recorded in the literature, eleven of which were reported as attributable to the anesthetic. Teter (1915) collected 938,924 cases of nitrous oxid, 32,172 of nitrous oxid and air, and 190,724 of nitrous oxid-oxygen anesthesia (total of 1,161,820) with two deaths. Statistics compiled by Andrews nearly fifty years ago covering over 200,000 cases showed the mortality of anesthetics then used as follows: chloroform one death in 2,723; sulphuric ether one in 23,204; mixed chloroform and ether one in about 7,000; nitrous oxid no deaths in 75,000 cases. Davis says it has for some time been his custom to give nitrous oxid-oxygen for very serious cases where it was thought the anesthetic of extreme danger. "We have not had a death which could in any way be attributed to its use, and we all believe that it has been the means of saving many lives." (Davis.) The author further adds that nitrous oxid and oxygen, combined in the proper proportions and skillfully administered in suitable cases, is undoubtedly the most desirable and safest of general anesthetics, in which opinion I fully concur after a rather extensive experience with the various methods of inducing surgical anesthesia.

The technique of gas administration is now so well understood that further comment seems unnecessary. It should be given only by those familiar with the possible dangers incident to inexpert administration, remembering that technical error may at any time be responsible for the sacrifice of a human life. It is of the utmost importance to guard against cyanosis and respiratory difficulty by careful regulation of the admixture of gas and oxygen, especially during prolonged administration.

I agree with Miller that gas-oxygen is contraindicated in children under five years, because of the small size of the respiratory passages and the increased liability to asphyxial symptoms; for the same reason it should not be employed in enlarged tonsils, cellulitis, tumors of the neck or other respiratory obstruction. It is contraindicated in serious cardiac lesions with broken compensation, aneurism, emphysema, and marked arteriosclerosis.

Some of the contraindications mentioned by Sajous (1915) are abstracted merely to suggest that they do not appear to be well founded: Circulatory abnormalities constitute the most frequent contraindications to nitrous oxid; it should be avoided in well-marked atheroma—especially if high blood pressure coexists—and in cardiac dilatation, with or without valvular lesion. Mitral stenosis, aortic regurgitation, and "beer heart"* are generally held to contraindicate nitrous oxid, also the combination of high blood pressure with a weak cardiac first sound.

Buxton regards the anemic individual; the overgrown boy; the nervous, sensitive child subject to fainting; the child with congenital cyanosis, and the person with hypertrophied heart; as among the most dangerous types of individuals for nitrous oxid because of their liability to syncope and asphyxia. He admits, however, that if care be exercised to obviate struggling and undue exclusion of air or oxygen, no absolute contraindication to gas anesthesia is presented in even such cases.

Marked respiratory embarrassment, especially if due to swelling which will be made worse through venous congestion, contraindicates nitrous oxid anesthesia; but if dyspnea be of minor extent—as is frequently noted in patients with tonsillar swellings, Ludwig's angina, glandular and other enlargements exerting pressure on the respiratory channels, enlarged thymus, large adenoids, intra-abdominal effusions or neoplasms pressing on the diaphragm and heart, obesity, pleural adhesions, and general affections causing dyspnea—nitrous oxid may be used provided care is taken to avoid asphyxia during the anesthesia.

In the aged intolerance of asphyxia and circulatory stress is likewise a feature to be remembered, especially if chronic bronchitis is present; nitrous oxid, however, is not contraindicated by old age *per se*. (Sajous.)

It is suggested by Miller that in unskilled hands, as a routine anesthetic, nitrous oxid-oxygen is undoubtedly more dangerous than ether. In the hands of the expert, also, the routine use of nitrous oxid-oxygen is attended by greater immediate danger than accompanies expert etherization. In selected cases the expert can save many lives which would be forfeited under ether or chloroform anesthesia by the use of nitrous oxid-oxygen.

I agree perfectly with Botsford that insufficient muscular relaxation is not only the chief objection made by the surgeon, but also the main difficulty encountered by the anesthetizer in administering nitrous oxid and oxygen. It is always possible, however, to control or modify muscular tension by the addition of ether, and with proper co-operation on part of surgeon and assistants the amount may be so small as to produce no systemic effect, and the patient awakens at completion of the operation to full consciousness as though no ether had been used.

Contrary to the opinions of other authors nitrous oxid is believed to be especially desirable as an anesthetic in patients with anemia and acute infections; and in those with impaired kidneys and respiratory affections it should always be employed in preference to ether or chloroform. In all patients who are considered serious surgical risks, such as those with general peritonitis, in the presence of shock from any cause, for amputations, Caesarian operations, etc., it is the anesthetic of choice.

Preliminary to the administration of nitrous oxid-oxygen anesthesia in general surgery it has been my custom to give the patient one hypodermic of atropine sulphate gr. 1/200 to gr. 1/150; and where there is no contraindication I include morphine gr. 1/8 to gr. 1/4. These drugs have been found advantageous in that after their administration greater relaxation of the patient may be secured during the nitrous oxid-oxygen anesthesia.

In this connection it seems pertinent to remark that during the last few years there have been devised and described nearly thirty types or modifications of apparatus for the administration of nitrous oxid-oxygen anesthesia. Personally I have used eight different kinds in private and hospital practice. For the induction of surgical anesthesia I now prefer the so-called "safety" apparatus manufactured in Chicago, Ill., for which the following are some of the advantages claimed:

(1) The instrument is simple in construction and easy of manipulation.

(2) A sight-feed arrangement enables the anesthetizer to ascertain at any time whether the patient is receiving the proper admixture of gas and oxygen.

(3) The gases are intermixed in the "mixing chamber" of the instrument and not in the administration bag.

(4) The proper ratio of gas and oxygen may be maintained with the minimum amount of mechanical adjustment.

(5) The gases are mixed, "warmed, washed and moistened" before reaching the respiratory organs of the patient.

(6) The administration bag is so constructed as to permit of direct rebreathing whenever this is desired.

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* Just what is meant by "beer-heart" does not appear to have been satisfactorily explained by Sajous or other authors who have copied from his writings. I confess utter ignorance upon the subject.—E. L. H.

(7) The mask includes a cylinder for ether administration provided this becomes necessary or advisable.

(8) The mask is so arranged that no adjustment is necessary, and either the nose or full-face mask may be used.

(9) The apparatus is light, readily portable, and insures "simplicity, efficiency, safety, economy, and accuracy."

For the induction of surgical anesthesia with nitrous oxid-oxygen I am now using this so-called "safety" appliance almost exclusively, and have found it entirely satisfactory. The sight-feed arrangement is considered one of the greatest improvements.

REFERENCES:

Andrews: Quoted by Davis, v. i.
Bevan: Journal of the A. M. A., 1915, lxv, 1418.
Botsford: American J. Surg., Anes. Sup., 1916, xxx, 44.
Casto: Quoted by Miller, v. i.
Davis: Interstate Medical Journal, 1916, xxiii, 1053.
Evans: American J. Surg., Anes. Sup., 1916, xxx, 52.
Miller: American J. Surg., Anes. Sup., 1916, xxx, 86.
Sajous: Quoted by Davis, l. c.
Teter: Quoted by Miller, l. c.

RADICAL OPERATION FOR UMBILICAL HERNIA, COMPLICATED BY EXCESSIVE ABDOMINAL FAT. A CASE REPORT.*

Report of Case, and Presentation of Specimen.

Max Goldman, M. D.
Kansas City, Mo.

Obesity and repeated pregnancies are the most common factors in the development of the umbilical hernias of adults; hence statistics show that the majority of cases occur in women. Piersol[1] states that nearly 75 per cent. are in women. The umbilical ring is so constructed that its weakest segment is the upper half of its circumference; at this portion, as a rule, one finds signs of protrusion and relaxation of the ring, the latter yielding more and more as the omentum, omental fat and, often the colon, forced on by the increased intra-abdominal pressure, are pushed forward towards the exterior; often the linea alba is involved to such an extent that a sort of ventral hernia is developed ultimately. Numerous diverticula or sacculations form, the growth of omental fat soon making the contents of the hernia irreducible, intestinal obstruction and incarceration often supervening. The peritoneum becomes extremely thin; the increase in the size of the tumor is frequently observed to take place *pari passu* with the development of the obesity.

The treatment is prophylactic, palliative, or radically surgical. The mortality following operation is still relatively high.

Mrs. ———, a German housewife of thirty, married nine years, was never pregnant, but always regular in her menstrual periods. Her family history is negative; her parents are living and in good health; her father is of medium height and weight, her mother less than five feet in height and below the average in weight. She has three brothers all of whom are of medium height and weight.

Her health has always been good except for the discomfort of her *excessive weight,* which was considerably over *300 pounds!* The pain and distress occasioned by the disturbances occurring at various intervals on account of pressure and obstruction in the portion of the intestines contained within the umbilical hernial sac were at times very severe.

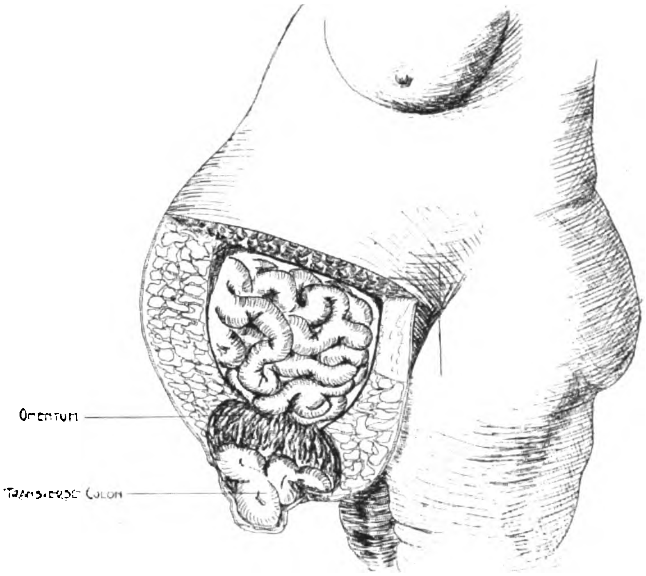

Fig. 1. Schematic. Observe the coil of transverse colon with the hernial sac.

At about her twelfth year, she began to increase in weight rapidly following a violent fall down a flight of stairs, which rendered her unconscious for several days; and about ten years ago she discovered a protrusion at the umbilicus which rapidly increased in size, the abdomen at the same time becoming thicker, heavier, and more pendulous. Just prior to operation on April 7, 1916, the hernial ring measured fifteen cm. in one diameter and twelve cm. in the other; the abdomen measured a fraction over 167 cm. in circumference; her height was five feet and four inches, and the pendulous abdominal wall, the patient standing, reached over the pubes more than *half* way to her knees. The hernia protruded markedly and it was not difficult to determine by palpation and percussion that in addition to omentum, a considerable amount of intestine contributed to the elements of the sac contents.

The operation was performed under ether. The skin was prepared with iodin. An area including all of the protruding hernia having been outlined, an incision in the form of an ellipse was made measuring 107 cm. in length and 30 cm. in width. Very *rapid* dissection of the wall of fat was carried out, beginning with the left corner, attending carefully to hemostasis, and proceeding toward the region of the hernia; at the umbilicus the layer of fat suddenly disappeared, owing to the protrusion of the thin peritoneal sac toward the surface, *i. e.*, just beneath the skin. Stopping the dissection here the same steps were carried out in the dissection of the portion of fat to the right of the hernia, and then with scissors, the enormous flap was removed by a circular incision through the skin covering the hernial protrustion. Hot towels were placed over the exposed abdominal aponeuroses, the edges of the wound were brought temporarily together by means of tenacula, and the second half of the operative procedure, that of radically closing the hernia, commenced. This was done by overlapping the flaps according to the principles established and recommended by C. H. Mayo[2] for the closure of ventral and umbilical hernias, with the difference that silk was used here for the mattress sutures. The hernial sac was large and sacculated, contained the entire omentum and the greater portion of the transverse colon. The flap of belly-wall fat removed, together with the hernial contents, weighed forty pounds. The gap was closed with several silver wire retaining sutures, between which were inserted "interrupted continuous" sutures of catgut, and an 8-inch gutta percha drain was placed at each end of the long incision.

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* Presented before the Jackson Co. (Mo.) Medical Society, April 11, 1916.

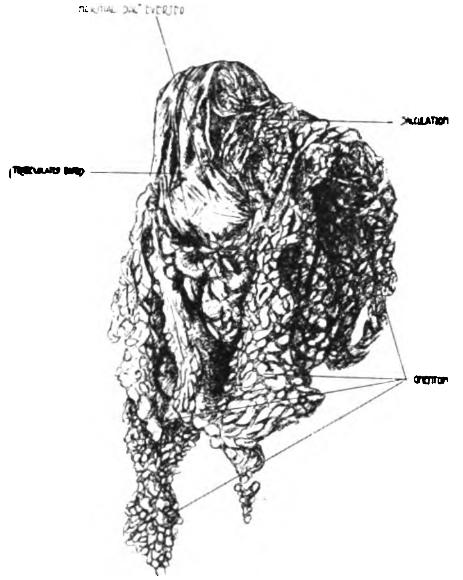

Fig. 2. Sketch of flat flap excised. Incision 107 cm in length. (42 inches.)

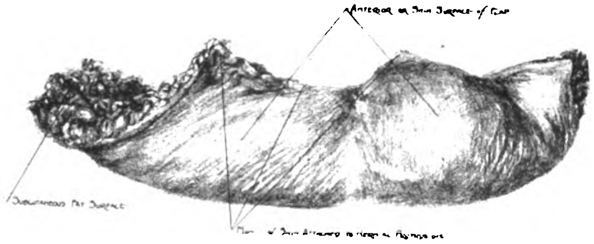

Fig. 3. Hernial sac everted, showing trabeculated bands and sacculations. Observe the extraordinary amount of omentum removed.

The post-operative course was remarkable for the absence of shock; healing occurred by first intention, and twelve days after operation, there was entire absence of signs of infection, though the condition of the skin along the lower portion of the abdomen, *i. e.*, over the pubic region, had invited contamination. Twelve months following the operation the patient was in perfect health, neither the hernia nor the adiposity showing any tendency whatever to recur.

The case is of unusual interest though a number of similar ones have been reported, the most conspicuous among the latter being one described by Cullen[3], of Baltimore. Howard A. Kelly is credited with being the first to recommend this procedure (lipectomy) for the cure of such an unhappy combination of physical defect and deformity as the one described above.

References.

1. Geo. A. Piersol, *"Human Anatomy,"* J. B. Lippincott Company.
2. C. H. Mayo, *Journal A. M. A.*, XLI, 225.
3. Thos. Cullen, *Surg., Gyn., and Obst.*, 1915, XX, 265.

MEDICO-MILITARY EXPERIENCES.

SIDE-LIGHTS ON THE DAILY WORK OF AN AMERICAN MEDICAL RESERVE CORPS OFFICER ABROAD.

[In the September issue we publish the first letter from First Lieut. Arthur E. Guedel, M. R. C., relating his impressions of two months of active army duty in this country. Following is his second letter descriptive of his trip abroad. It is not only interesting but very reassuring.—Ed.]

Editor American Journal of Surgery:

"Uncle Sam's personally conducted tour" is well named. I cannot imagine easier or more interesting ocean travel than ours was to Europe. Free from all responsibility, free from all care save perhaps one, with ever intermingling senses of anticipation and realization of interesting incidents, ours was a happy party.

There were fifty of us unattached medical officers on a transatlantic liner, together with two regiments of engineers, making about three thousand passengers all told. Yes, we were crowded, but not so much so as the foregoing statement would indicate, and the general spirit of good fellowship which prevailed more than compensated for what, in civil life, might have been considered too many people in too small a space. All officers had first class staterooms. The troops were carried below deck in specially constructed and well-ventilated quarters. However, the weather was so delightful that everybody spent most of his time by day on deck.

There was always something doing to render the voyage free from monotony and the fourteen days on the ocean passed quickly by. Those regiments of engineers comprised an exceptionally fine lot of men and many of them were, of course, good athletes. Boxing was staged daily and there was ample material to furnish an entire new card each day, which was done except when there was a call for the return of some unusually clever man. These men were not of the rough-neck slugging variety. On the contrary, there were many college athletes and some professional wielders of the mattress mitt and the average quality of these bouts was higher than that of the usual boxing show back home. Certainly the sporting spirit was better.

Band concerts formed another daily feature, usually in the middle of the afternoon.

Each day the troops were put through regular drills, working on the promenade deck in squads of about two hundred. Their work began very early in the morning, as each officer whose stateroom opened on the promenade deck can testify. That early morning snooze was for the first few mornings entirely disrupted by loud commands and the louder clatter of arms. However, nobody considered this an inconvenience for by the time the novelty and interest in these movements had worn off we had become accustomed to the noise and continued our morning nap.

Officers and men had separate lounging rooms most comfortably furnished and with well-equipped libraries. The pianos were going strong most of the time. There were a number of good musicians on board and bashfulness was a thing not present. Everybody who could play did so and the repertoire covered everything from the classics down to "The Old Gray Mare and the Whiffle Tree." Each evening would see these rooms filled and the songs were typical of good fellows together. Sometimes everybody sang and then it was fortunate that the two rooms were well separated. However, as a rule the floor was given over to those who *could* sing and the rest of us sat back and enjoyed it. There were a couple of excellent quartettes among the men of the regiments and these were much in demand. They could sing indeed. I remember that one of them sang "Asleep in the Deep" most beautifully, but for some reason or other this particular song failed to make a hit.

I spoke above of our freedom from all care save perhaps one, and that one was the so-called submarine danger. Danger? Well, perhaps it was, but so far as our lives were concerned it seemed at most a small one. At any rate with most of those on board this was more a subject for good jokes than it was a care, and the jokers would get busy whenever a manifestly timid passenger put in his appearance. Many stories were told of submarine atrocities and these stories were of such a character as to make the tales of Baron Munchausen monuments of fact by comparison. At first the apparent discomfiture of the timid man upon hearing these stories was funny. This might seem uncharitable and but poor sport. As a matter of fact those tales did more toward quieting his fears ultimately than anything else could have done, for usually the competition among our "historians" soon brought out stories that even the most gullible must reject. Then the pendulum would swing to the other extreme and the timid one, not knowing what to believe, believed nothing.

The real danger was small, for we were well protected. There were several ships in our convoy. There was no doubt that in case we had stopped a torpedo we should have been taken off immediately or picked up in a very short time if forced to take to the water. But any one who has seen a squadron of destroyers at work at once realizes how difficult it is for the submarine—"tin fish" as we call them—to work when these little devils are around. It was magnificent to watch them. Bobbing and rolling around, one moment here, the next there; sometimes sliding along lazily with our bigger and slower ships and then skipping off suddenly at almost incredible speed on a scouting expedition, they seemed to be everywhere at once. The cognomen "mosquito fleet" truly applies to their appearance, but their activity impressed us more like that of hornets. The submarines have learned from experience not to mix things with a destroyer. The German sailor likes to live as much as anybody else.

I am sure that the fear of the submarine by those back home is unnecessarily magnified. For example, we were much more anxious on our first few days out of America when there was no danger of attack than toward the end of the journey when we were in the "danger zone." This was not due to the fact that constant association with any danger lends immunity to fear of it. It was due rather to our acquired knowledge of the efficient protection provided for us, a knowledge gained first-hand of the true state of affairs. The only fear that the ships' officers had regarding loss of life in case of attack was that of panic among the passengers. They stated that during the past year nearly all deaths in submarine attacks on passenger ships were due to panic.

To guard against such panic we were all put through lifeboat drills repeatedly. These drills were conducted at any time during the day and once at night. Each man had assigned to him a definite position at the lifeboats or rafts and at the warning bugle call would proceed at once to his position and stand at attention. Each boat squad was well commanded and the discipline here was very rigid. With the first few drills there was some confusion, but later it was remarkable to see every man in position and ready to "abandon ship" within three or four minutes after the warning call, and not a word or a command spoken.

When I state that fear of the submarine by the ships' officers was negligible I do not mean that they were careless to it. It was their care and the fact that they compelled every precaution to be observed together with their never-relenting watch that reduced our concern to almost nothing. We were compelled to wear our life-belts constantly during the last four days of the voyage. We walked in them, rested in them, even ate our meals in them and at night slept with them under our pillows. Each man on board was instructed personally as to the use of the life-belts and each belt was inspected daily by the commanders of the boat squads to see that they were in perfect shape. At first the life-belt regulations caused us considerable annoyance, but we soon were used to them. We tried for a while to give the belts a suitable appellation, but inasmuch as profanity is considered bad taste even in the Army, we gave up the idea.

Lights out or port holes closed was the order and one to be obeyed. Our ships were not the brilliantly-lighted ocean palaces of peace times. Far from it. Any spark of light on deck at night was sure to elicit an immediate yell from a ship's officer or the guard. No smoking on deck at night. Some idea of how dark it was on the outside of these ships is had from the statement that as a rule it was impossible for us to distinguish the outlines of the other ships in the convoy, even though they were but three or four hundred yards away. The guiding light carried by each ship was so shaded that it could be seen only from a short distance astern.

It is the fact that the submarine danger is treated as a great one which renders it small and it is the close observance of every precaution that is rendering the shipping of troops abroad a safe procedure. It is due to these careful tactics that the British have been able to carry some four hundred thousand Canadian troops across the Atlantic without the loss of a single man.

It might seem that this darkness and the other rigid regulations would render the trip unpleasant, but everybody entered into the game with such a jovial spirit that it was more interesting than the uneventful ocean voyage of peace times.

One of our favorite daily pastimes was searching the sea for periscopes. To the timid ones any floating débris, a barrel, the fin of a great fish, etc., would usually assume the appearance of a periscope and the call, as per instructions, from any of the passengers of "Starboard bow" or "Port bow" always brought a rush of glasses to bear upon the point indicated. Then the remark, which toward the end of the trip assumed a tone almost of disappointment, "It is a barrel" would usually break up the party for the time being.

The incidents of our departure from America and our arrival abroad will remain with us longest. I do not believe that the word artist lives who can adequately portray the thrill of our departure, and I shall certainly not attempt it.

It was in the early evening of one day that we started. What with the weighing of anchors, the raising of colors, stirring music from the regimental bands, and the continuous cheering of many thousands of soldiers as those great liners began to maneuver into their place in line, there was a thrill for every man, a thrill that, as stated by some, was almost worth a life's work. We understood then, most of us for the first time in our lives, what it is that makes the old campaigner go back to the Army in time of war. There was not a man among us at that moment who could express the vastness and depth of that thrill and who did not feel sorry for the fellow back home. Then as the fleet moved along out of the harbor a strange quiet prevailed, probably the quiet of deep thought with all of us. There was but little talk and that little was composed of a few attempts by some to express their true feelings. They ended by stating feebly the equivalent of "I tell you, I'm glad I'm here." And the source of that feeling was that every one of them was answering the call, was doing his bit for his country in this time of need. We all felt it, but none can ever describe it. It was a thing too big and too deep for description.

As we landed at our European port many days later the same thrill caught us up and held us. There was no demonstration by great masses; only a very deep sense of satisfaction within every one of us. We were where we belonged.

FIRST LIEUT. ARTHUR E. GUEDEL,
M. R. C., U. S. A.

TO OFFICERS OF THE MEDICAL RESERVE CORPS U. S. ARMY INACTIVE LIST.

Word received from the Surgeon General of the U. S. Army, conveys the information to officers of the Medical Reserve Corps of the United States Army, inactive list, that assignment to active duty may be delayed, and that they are advised to continue their civilian activities, pending receipt of orders. They will be given at least 15 days' notice when services are required.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

New York, November, 1917.

THE COUNTRY'S CALL ON THE PROFESSION.

Many thousand civil practitioners have responded to America's call and are now in active service in the army and navy. But the response is not yet by any means sufficient. The army is still about 10,000 short of the 24,000 estimated as needed. What is holding back the 10,000 men who should have volunteered and have not? Are you one of them? Why have many who have applied for and received commissions in the Medical Reserve Corps failed to accept them?

There can be no complaint of the physician who does not volunteer because of physical disability, obligations to his community that cannot be assumed by another, or family necessity not provided for by savings. There can be only scorn for the physician who holds back solely on the ground of self-interest or of fear.

Of the thousands with the colors is a large percentage of older men, with families and large expenses. They ought to be an example to the 10,000 that are wanting—men with no dependents, sufficient savings, and reputations that assure a resumption of practice; and the young men recently graduated from colleges and hospitals, also with no dependents and with little or no practice to forego.

Those who can serve should. Will the 10,000 answer that call or will they wait until Congress may decree that *those who can serve must!*

The physician who measures his country's need against his own indifference, fear or selfishness falls far indeed below the standards of citizenship, patriotism and medical tradition.—W. M. B.

THE SENIOR MILITARY MEDICAL ASSOCIATION.

Physicians who, by reason of their age, physical defects or teaching obligations, are unable to join the Medical Reserve Corps, will nevertheless have opportunities for military service to their country through the recent commendable organization, with the approval of Surgeon General Gorgas, of the Senior Military Medical Association.

The purpose of the Association is to enroll physicians who can give part or whole-time military service in their home towns or elsewhere in this country.

As our share in the war develops there will probably be need for many such men (as "contract surgeons" or otherwise graded), to serve as consultants, specialists, etc., in home hospitals and in reeducation institutions, in the examination of recruits and conscripts, in the physical or mental restitution of men rejected from the army or incapacitated by wounds, in laboratory researches, etc.

The venerable W. W. Keen, an army surgeon in the Civil War, is president of the Association; James M. Anders and John B. Deaver, also of Philadelphia, are vice-presidents. For the present, membership eligibility does not extend beyond Pennsylvania, New Jersey, Delaware and Maryland but branches will no doubt be established elsewhere. Application for admission to the association may be made to the Secretary, Dr. Alexis Dupont Smith, 5926 Greene St., Germantown, Pa.—W. M. B.

THE DOCTOR'S CONTRIBUTION.

In this world's war, your service is absolutely essential.

The medical officer bears the same relative position in war as in peace in that he is a conservator of health and life.

Through his skill, thousands of men receiving slight casualties, are returned to the fighting force, thus conserving the physical strength of the army.

In Base, Field and Evacuation hospitals, doctors are as essential as in civil institutions, where the sick and injured are cared for.

As regimental surgeons and on transports and in the Sanitary Corps, must the Government have doctors if we are to terminate this war successfully.

Your contribution to your country at this critical time is *your service* which you can give for the period of the war as an officer in the Medical Reserve Corps. That your country needs you, is best answered in that she is calling you *now*.

The fighting forces are constantly expanding and such expansion calls for additional doctors and even with the troops now in training and under mobilization (about two million) the Surgeon General has not enough doctors to fill the requirements.

Secure an application blank at once; fill it out and present it to your nearest Examining Board. Do not live to regret that you did not have a part in your country's great struggle for democracy which means *Liberty*.—MACD.

SURGICAL LESSONS OF THE WAR.

A war lasting over three years and producing hundreds of thousands of wounded men for treatment has, of course, taught many valuable surgical lessons. It would appear thus far, however, that the knowledge gained has not been of any new principles, but rather of experiences in the applications of acknowledged principles. Thus there have come about useful and important modifications in the technic of plastics, in the treatment of fractures, especially the compound, and of amputations, and valuable observations concerning the management of perforating wounds of the thorax, the abdomen and the central nervous system.

The biggest thing, perhaps the only big thing, surgically, that has thus far come out of the war has been the management of wound infections—a vast and pressing problem that was quite inconspicuous in the South African, the Russo-Japanese and even the more recent Balkan wars.

From the outset the study of antiseptics became of great importance and the older ones, and several new ones, were critically observed both clinically and in the laboratory. Some of these have been retained and are more or less actively in use in the military hospitals. Wright's method of wound treatment by hypertonic salt solution has also been tried out, but reports would indicate that it does not find great support. The antiseptic that appears to be most successful, Dakin's solution of sodium hypochlorite, is also not generally employed abroad, but as the Carrel-Dakin method is coming to be better understood and Carrel's technic is being learned, this means of combating wound infection is gradually growing in use and bids fair to being adopted as a standard procedure. From all reports, it gives far better results than any other method. Thus, Depage at La Panne is reported by Gibson to have shown him 80 compound fractures treated by the Carrel-Dakin method, all of them free from suppuration. The warmest supporters of Carrel's technic are those who have mastered the details.

It is in these minutiae and, especially, in the difficulties that attend the proper preparation of the Dakin solution, that the method has its greatest objections. To prepare the sodium hypochlorite solution, of proper strength and reaction, from "chloride of lime" required a skilled chemist to titrate various samples of each can of the bleaching powder, and much mixing, settling, filtering and again titrating. Now, however, that the solution can be made, accurately, quickly and very cheaply, from liquid chlorine and sodium bicarbonate—the chlorine escaping through a meter into a simple solution of sodium bicarbonate—the preparation of the fluid loses all of its terrors and most of its errors. The Carrel-Dakin method of treating wound infections is the most important contribution of military to civil surgery that has come from this war, thus far.

That an apparently clean granulating wound, once suppurating, can often be successfully closed is, of course, not a new observation, but the adoption of this as a routine procedure based, not on gross appearance alone, but on the determination of the number of bacteria in smears from the wound secretions, is new and is another lesson learned from Carrel—the economic importance of which needs no argument. We have also learned from him and his associates that an apparently clean, granulating surface wound will not heal in the shortest time if treated, as we usually treat such wounds, merely aseptically. To secure maximum healing the bacterial growth must be restrained, antiseptically, as by the employment of chloramine (chlorazene) paste. Carrel and his co-workers at the Rockefeller Institute, notably du Noüy, have published in various numbers of the *Journal of Experimental Medicine*, 1916, and 1917, their interesting observations on wound cicatrization, and quite striking and fascinating is the method by which du Noüy plots the curve of cicatrization with which he can predict the date of final healing; and it is equally interesting to note how a rise in the bacterial content of a cicatrizating wound at once disturbs the curve!

Important details in the technic of skin and fat grafting are also gifts to us from the wizard of surgery, Alexis Carrel, and the brilliant, painstaking men who are working with him.

From the side of pure laboratory investigation, the development of an antitoxin for the gas bacillus infection (bac. Welchü), seems at present to be the greatest accomplishment stimulated by the war. This antitoxin, produced by Carroll G. Bull and

Miss Ida W. Pritchett, of the Rockefeller Institute, (*Journal of Experimental Medicine*, July, 1917), has not yet, as far as we know, been tried out on the battlefield; but animal tests and some observations on human beings indicate that it works with a biochemical accuracy that may well be spoken of as "mathematical."

The extent of shell and shrapnel injuries and, especially, their rapid development of severe infections, has demonstrated the need, in most cases, of very early operative treatment, a highly important consideration also in penetrating abdominal wounds. It has thus come about that these cases are not delayed until they can reach the base hospitals but are operated upon within a few hours of the firing line at what, in the American army, would be called "evacuation hospitals" and what the British call "casualty clearing stations." This is a decided change in procedure. It leaves much for the base hospitals to do in reparative surgical work, but injuries that, in previous wars, could have waited for transportation to base hospitals, must now by reason of threatening infection, be handled radically as soon as possible.—W. M. B.

COURT PLASTER.

In the midst of the numerous hysterical seizures regarding the existence of pro-German activities, it is not unnatural to have various types of crime attributed to pro-German sources. The discovery that some court plaster contained tetanus bacilli naturally gave rise to a fear that these contaminations were intentional and designed to infect and destroy the users of court of plaster.

It is re-assuring to find in *Public Health Reports*, September 7, 1917 that no evidence exists that court plaster has been deliberately contaminated. Of fourteen specimens examined from various local pharmacies, two revealed the presence of the tetanus organism. In all probability, had the bacteriological investigation involved the use of a larger number of specimens or indeed larger areas of the same specimens, the number of positive results would have been increased.

While interesting laboratory questions are involved to determine the source of the infection, whether the cause lies in the use of infected ingredients or in careless handling after manufacture, the fact remains that court plaster can not be regarded as surgically clean. Inasmuch as the use of court plaster in surgery is exceedingly small and practically no casualties have been reported resulting from its use there need be little fear concerning this new discovery of uncleanliness and contamination.—I. S. W.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

A VAGUE LAW.

Legislation seeking to protect the public from exploitation by charlatans is wholly desirable. It is unfortunate, however, when legislative enactments designed to protect the public actually result in conditions which may be to its detriment.

The New York State law which prohibits advertisements concerning venereal disease and symptoms referring to the genital organs appears to work against the public interest if a strict interpretation of the law is accepted. While advertising of venereal diseases is termed a misdemeanor punishable by fine or imprisonment or both "This section," it is stated, "shall not apply to didactic or scientific treatises which do not advertise or call attention to any person or persons from whom or any office or place at which information, treatment or advice may be obtained, nor shall it apply to advertisements or notices issued by an incorporated hospital or a licensed dispensary or by a municipal board or Department of Health or by the Department of Health of the State of New York."

In all probability the courts would not construe this law as applying to a genito-urinary surgeon who places his title after his name over or under an article published in a scientific journal. One might ask what is the legal status of medical publications dealing with urology or surgery if they publish articles dealing with varicocele, impotency or spermatorrhea in which reference is made to drugs or medical procedures helpful in the treatment of these conditions. The mere fact of publication implies the capability of the writer to treat such conditions and thus would appear to constitute indirectly an advertisement contrary to the intent of the law.

Health departments, hospitals and dispensaries are privileged to announce the names of capable practitioners who would seem to be otherwise restricted in asserting themselves to be capable of giving treatment or advice to sufferers from the venereal diseases and certain other sexual disabilities.

In the opinion of Attorney General Lewis: "The other exception to the general prohibition, permitting incorporated hospitals and licensed dispensaries to publish advertisements shows clearly that it is not the intent of the statute to prevent incorporated hospitals or licensed dispensaries from advertising. This being so, it clearly would not be a violation of the spirit of the law if, after his signature to a scientific or didactic treatise the author should put the address of an incorporated hospital or a licensed dispensary with a statement of his position in that institution."

In a rigid interpretation of the law, judging from the paragraph quoted, it does not prevent the publication of medical journals, monographs, or books which discuss drugs and medicines, providing that there is no direct reference to persons by whom such drugs or medicines are employed and whose services might be secured for active remedial treatment. If, however, the publication of drug advertisements in scientific journals is actually prohibited under the present wording of the law, a manifest error has crept into the law which should be corrected by amendment at the next meeting of the legislature. As a matter of fact the limitation is clearly designed to prevent pseudo-scientific articles to be substituted for the ordinary forms of quack advertisements.

It is difficult to believe that it was the purpose of the legislature to check legitimate publications or to prohibit accurate scientific advertisements under the guise of an attempt at regulating quackery. Such an endeavor would be contrary to the spirit and interests of medicine, surgery, and social welfare. The legitimate advertisement of recognized drugs is not fraught with danger, but represents a normal and natural method of bringing to the attention of the profession the virtues of the ever increasing number of drugs which research and investigation have developed in the interest of public health. The mere fact that such substances as protargol, argyrol, potassium permanganate, silver nitrate, copaiba and sandal oil and hyoscine are employed against genito-urinary affections does not operate against making their usefulness, their merits or demerits known to the medical profession in normal and legitimate channels of publication.

Book Reviews

A Treatise on Regional Surgery. By various authors. Edited by John Fairbairn Binnie, A.M., C.M., F.A.C.S., Kansas City, Mo. In three volumes, *Volume I.* Octavo; 652 pages; 351 illustrations. Philadelphia: P. Blakiston's Son & Co., 1917. $7.00, net.

This is the first of the three volumes which make up this treatise and describe the surgical affections of the head, neck and thorax with the exception of those of the chest wall, lungs and pleura. Many men are associated in this work and among them are famous surgeons.

The subject matter is discussed in a series of different articles all of which, having been written independently, exhibit a marked diversity of arrangement and manner of description. The arrangement of these in an anatomical order gives the only semblance of a connected discussion. Much repetition has resulted.

The worth of the various articles is variable. A few are indifferent; some are excellent, notably so the chapters devoted to the ductless glands of the neck, and to the heart and pericardium. The chapter on the larynx and trachea gives a minimum to actual disease and a maximum to the art of bronchoscopy, the discussion of the latter seeming to dominate everything. Too much space is given to some conditions (carotid body tumors) which one meets but rarely. No discussions are given of the general principles of the large subjects of fractures and dislocations; nor of such entities as tuberculosis or syphilis.

The style of the many chapters is for the most part short and choppy and the profusion with which the subject matter is arranged in tabular form, gives one the feeling that the book would be welcome to the medical student who is "cramming" for an examination. For the most part, therefore, the discussions are inadequate for the serious student or practitioner.

Finally much is wanting in that allusions to the newer laboratory diagnostic methods are few and far between.

The make-up of the book is pleasing. The paper is good, the type large and easy to read. The illustrations are numerous, well made and when needful have been colored to give the reader a truer concept of the subject portrayed.

Fractures of the Lower Extremity or Base of the Radius. By Lewis Stephen Pilcher, A.M., M.D., LL.D., Brooklyn, New York. Consulting Surgeon, Bushwick, German, Jewish, St. John's and Bethany Deaconess Hospitals, and New York Skin and Cancer Hospital; Editor of *The Annals of Surgery.* Duodecimo; 116 pages; 132 illustrations. Philadelphia and London: J. B. Lippincott Company, 1917. $2.00.

This little book is a reprint of the article which appeared in the January number of the *Annals of Surgery.* It gives the accumulated experience of many years and in addition discusses at length the mechanism and pathology of these fractures in the light of this experience. The name of Colles is purposely omitted from the discussion because "the use of the name in question has been associated with erroneous views of the nature and cause of the injury."

The forces producing the fracture are discussed in relation to the anatomy of the wrist and the nature of the resulting deformity is indicated. These and the lines of fracture are profusely illustrated by many excellent drawings and skiagrams.

Treatment is discussed in detail and it is pointed out that with proper methods a splint is not necessary. The usual fault seen is that immobilization is kept up for too long a time. When the fracture heals with deformity it is not always necessary to interfere because frequently motion and power return practically to normal.

The Roentgen Diagnosis of Diseases of the Alimentary Canal. By Russell D. Carman, M.D., Head of Section on Roentgenology, Division of Medicine, Mayo Clinic; and Albert Miller, M.D., First Assistant in Roentgenology at the Mayo Clinic. Octavo; 558 pages; 504 original illustrations. Philadelphia and London: W. B. Saunders Company, 1917. $6.00 net.

Carman's contributions to the Roentgen diagnosis of the gastro-intestinal tract are always instructive. His description in this book of the lesions as demonstrated by the roentgen ray, together with the illustrations and reports of individual cases, and the operative findings are so carefully detailed, that every student can readily follow the technic.

The authors do not agree with the findings of Case, Cole, Caldwell, Phahler, etc., as to the percentage of Gall-stone demonstrations on the plate. At the Mayo Clinic this percentage is greater than is usually assumed by the general surgeon, who still remembers the 5 per cent. which were found a few years ago.

The illustrations are unusually numerous, varied, and excellently reproduced. The type is clear, easily read, and the paper is of good quality, giving contrast to the cuts. The book is of value to every surgeon as well as to those following the study and practice of roentgenology.

Roentgen Technic. By Norman C. Prince, M.D., Attending roentgenologist to the Omaha Free Dental Dispensary for Children; Associate Roentgenologist to the Douglas Hospital, etc. Octavo; 140 pages; 71 original illustrations. St. Louis: C. V. Mosby Co., 1917.

This book consists largely of illustrations of the positions and exposures necessary for roentgenizing all parts of the body. Attached to each illustration is a description of the time and technic required. We can recommend this book to every beginner in the practice of roentgenology; and to those physicians who operate an apparatus for their own practice.

A Treatise on Orthopedic Surgery. By Royal Whitman, M.D., M.R.C.S. Eng., F.A.C.S., Assistant Professor of Orthopedic Surgery, Columbia University; Professor of Orthopedic Surgery, N. Y. Polyclinic; Associate Surgeon, Hospital for the Ruptured and Crippled, New York; etc., etc. *Fifth Edition.* Octavo; 906 pages; 704 illustrations. Philadelphia and New York: Lea and Febiger, 1917. $6.50.

Orthopedic surgery has been gradually broadening in scope so that, in the practice of many orthopedists, it may be said to cover all the affections of the skeletal tissues· including injuries to and infections of the bones and joints, effections of the muscles and of the peripheral nerves. Intensive studies in orthopedics have, too, been much stimulated by the recent epidemic of poliomyelitis in this country and by the many crippling injuries of war abroad. The prevention of deformities has thus come to the fore as one of the great tasks of the orthopedist.

Whitman evidently had these developments in mind in preparing the fifth edition of his standard book. Certainly it is a great improvement on the fourth edition which appeared in 1910. Much of the work has been re-written and all of it has been carefully revised. One hundred or more new illustrations are included and the general appearance of the book is much improved. Its size, however, has not been increased. It is still essentially a text-book for the student, the general practitioner and the general surgeon rather than a reference work for the specialist.

Diseases of the Skin. By Richard L. Sutton, M.D., Professor of Diseases of the Skin, University of Kansas; Dermatologist to the Christian Church Hospital, Kansas City; etc. *Second Edition.* Octavo; 1021 pages; 833 illustrations and 8 colored plates. St. Louis: C. V. Mosby Co., 1917. $6.50.

Professor Sutton's work has been well received. It is but about a year since the first edition appeared. This second edition is larger and contains a great many new illustrations—140, to be exact. Indeed, the pictorial feature of the book—so important in a work on dermatology—deserves much praise, no less for the profusion of photographs, than for their selection and their reproduction. Another feature of value is the selection of references at the end of each section.

The book has been enlarged by about 100 pages and the more important literature of 1916 has been included. Three new sections have been introduced, viz., on gangrenous balanitis, atrophy of the mucous membranes of the tongue and mouth, and atrophy of the fatty layer of the skin.

An Introduction to the History of Medicine. With medical chronology, suggestions for study and bibliographic data. By Fielding H. Garrison, A.B., M.D., Principal Assistant Librarian, Surgeon General's office, Washington, D. C. Octavo; 904 pages; illustrated. *Second edition.* Revised and enlarged. Philadelphia and London: W. B. Saunders Co., 1917.

The second edition of Dr. Garrison's book arouses anew the enthusiasm we expressed when reviewing the first edition. As a mere compilation of facts the book alone astonishes by its amazing accuracy. We have read large sections of this book with a keenly critical eye and with the exception of one or two instances, we have not found an error of either commission or of omission. The erudition and research involved in writing this history, seems more the result of a lifetime than a matter of a few years. When, in addition, we find our facts so beautifully and logically marshalled, a critique and a sense of historical values there are almost infallible, a delicious characterization and a literary style unequalled among medical men in this country, we can readily perceive why this book has been received with such profound approbation. We repeat that Garrison's book work is one of which American medicine may well be proud.

Handbook of Gynecology. For students and practitioners. By Henry Foster Lewis, A.B., M.D., Professor and Head of Department of Obstetrics and Gynecology in Loyola University School of Medicine; Chief of Obstetric Staff of Cook County Hospital; Fellow and ex-President of the Chicago Gynecological Society, etc., etc.; and Alfred De Roulet, B.Sc., M.S., M.D., Professor of Gynecology in Loyola University School of Medicine; Attending Gynecologist to the House of the Good Shepherd, and to St. Bernard's Hospital; Obstetrician and Chief of Staff of St. Margaret's Home and Hospital. Octavo; 445 pages; 177 illustrations. St. Louis: C. V. Mosby Co., 1917.

This handbook of gynecology by Lewis and Roulet is a well written, very readable volume introducing the third and fourth year medical student into the domain of gynecology. Its one outstanding departure is not its brevity of detail but rather the logical arrangement and classification according to the lines of pathology. The preface, however, is full of statements calculated to win prospective student purchasers of the book, but nevertheless open to so much challenge by gynecologists that it would lead too far afield to compare prefatory promises with unrealized textual fulfilment. It is to be hoped that a further edition of the book will record a proper appreciation of the subject treated by the authors, namely that gynecology far from being a "lesser subject than medicine, surgery or obstetrics" is in reality all three combined and a part of each and that therefore it deserves "the attention and time and energy of the student" as an integral and important part of his course in medical study.

Bone and Joint Studies. I. By Leonard W. Ely, Assistant Professor of Surgery (orthopedics), and John Francis Cowan, Assistant Professor of Surgery, Leland Stanford Medical School, Stanford University, California. Published by the University, 1916.

This monograph contains the following studies: Experimental Infection of the Dog's Knee Joint (Ely and Cowan). Reaction of the Tissues of the Rabbit to Injury (Ely and Cowan). Regeneration of Bone Marrow (Ely). A Study of 100 Dry Bones sawn in the laboratory (Ely), and a Study of the Sterno-Clavicular Joint (Ely). Space forbids us to mention all of the interesting and far-reaching data that these studies reveal; we content ourselves with recording some of the more important. It was found that if the cartilage is removed from the surface of a joint it will eventually regenerate, and that this regeneration is mostly formed by the synovial membrane. This newly-formed cartilage has much the same appearance as that found in "arthritis deformans." If the marrow is removed from the shaft of the tibia of the rabbit, it will quickly regenerate without any trace of the operation.

These studies are models of their kinds. It is a pity that so little of this kind of work is done by orthopedists.

Animal Micrology. Practical Exercises in Zoölogical Micro-technic. By Michael F. Guyer, M.D., Professor of Zoology in the University of Wisconsin, President (1916) of the American Microscopical Society, with a chapter on drawing by Elizabeth A. Smith, Ph. D., Instructor in Zoology in the University of Wisconsin. *Revised Edition.* Octavo; 289 pages; illustrated. Chicago: The University of Chicago Press, 1917.

While primarily intended for zoological students, this book is eminently fitted for medical purposes. It covers the entire range of microscopic technic; fixing, section cutting (paraffin, celloidin, freezing, all varieties of staining, including blood and bacteria; embryological methods;

reconstruction of objects from sections; drawing and the use of the microscope. The book is full of valuable formulæ and hints. The book compares favorably with many of the standard works used by medical men, although it lacks some of the methods employed for demonstrating certain pathological lesions.

Obstetrics. A Text Book for the Use of Students and Practitioners. By J. Whitridge Williams, Professor of Obstetrics, Johns Hopkins University; Obstetrician-in-Chief to the Johns Hopkins Hospital, Baltimore, Md. *Fourth Edition.* Octavo; 1029 pages; 702 illustrations. New York and London: D. Appleton & Co., 1917.

Professor Williams in the fourth edition of his classic contribution to American medical literature has added the advances of the last five years. The book is too well known to require additional reviewing and comment. Suffice it to say that it has its peer in only two or three other volumes on obstetrics by American or English authors, and that specialists value it as much as and perhaps more than those whom the book is calculated to serve.

Physical Chemistry of Vital Phenomena for Students and Investigators in the Biological and Medical Sciences. By J. F. McClendon, Assistant Professor of Physiology in the University of Minnesota. Duodecimo; 240 pages; illustrated. Princeton University Press, 1917. $2.00.

This book comprises a course of lectures and laboratory work given to students. The aim of this volume is not to dwell upon physical chemistry but to show that the subjects treated can serve as a tool for physiological research.

Each chapter is well written and considers more or less one type of physical or chemical phenomena. The chapter on osmotic pressure is presented clearly, chapter VII on enzymes contains new data; the chapters on anesthesia, and narcosis, on cytolysis and disinfection, on blood and cell media have a pointed interest for medical men.

The entire volume holds a great deal of information and knowledge. Everything is brought up to date as far as possible. The book has also a comprehensive literature list on the subjects discussed and an index to this literature.

Common Diseases of the Male Urethra. By Frank Kidd, M.B., B.C. (Cantab.), F.R.C.S. Eng., Assistant Surgeon, London Hospital, etc. Duodecimo; 132 pages; illustrated. New York: Longmans, Green & Co., 1917. $1.75.

This compact volume is based upon a course of lectures delivered at the London Hospital. It aims mainly to present many years of patient, observant study of the gonococcus as it lives and thrives in the human urethra. The author's interests are clinical.

The book contains six lectures, all but the last dealing with etiology, diagnosis, technique for examination, treatment of urethrites. Lecture five considers the urethroscope; lecture six is on the clinical pathology of urethritis by Dr. Philip Painton.

There are also four appendices each one containing many points of value and interest. Of particular note is appendix II which presents the evidence tendered to the Royal Commission on venereal disease.

The Treatment of War Wounds. By W. W. Keen, M.D., LL.D., Emeritus Professor of Surgery, Jefferson Medical College, Philadelphia. Duodecimo; 169 pages; illustrated. Philadelphia and London: W. B. Saunders Co., 1917. $1.75.

Professor Keen, army surgeon in the Civil War, has prepared this small manual at the request of the National Research Manual. It is based on an analysis of many import articles, published in the past two years, on experiences with the newer antiseptics and with Wright's hypertonic salt solution, on the treatment of various types of war wounds, regionally considered, and on the transportation and general management of the wounded. To this are added abstracts of letters, secured for the purpose, from competent observers in military hospitals—Blake, Bowlby, Cabot, Crile, Cushing, Gibson, Lyle, and Murphy.

The manual is very useful both as a summary of established procedures and as a reference to important publications.

Progress in Surgery

A Résumé of Recent Literature.

Pain in the Arm: Subdeltoid (Subacromial) Bursitis: A Further Study of Its Cinical Types, Pathology and Treatment. Walter M. Brickner, New York. *Journal of the American Medical Association,* October 13, 1917.

Brickner, says that brachial neuritis is a real condition but a comparatively rare one, and when well established it should be marked by motor, trophic or sensory signs as well as by nerve tenderness. Careful examination should be made to determine whether the neuritis is not simulated or caused by something else. Pain in the left arm may be associated with an anginal condition (tobacco poisoning, among other things) as well as with such surgical conditons as cervical rib, fracture of the greater tuberosity of the humerus, spontaneously reduced luxation of the shoulder, subluxation of the shoulder which may be due to apparently inadequate causes in some cases, mild sprain of the shoulder, periostitis, neoplastic and inflammatory bone diseases, and chronic bone abscess. But far more common than any of these is subdeltoid (subacromial) bursitis, the immediate cause of which the author believes to be traumatic even when a history cannot be obtained. Concerning the commonly, but not always associated subbursal deposit of lime and other mineral salts in or on the supraspinatus (occasionally the infraspinatus) tendon, he believes that this deposit of salts is due to trauma and some metabolic predisposition, also that the disease is neither infectious nor toxic in its origin. The deposits, he finds, are always under the bursa, not in the cavity nor in its walls. There are always adhesions between the two walls of the bursa in the cases he has operated. He emphasizes the fact that the lime deposit takes place not gradually, but very speedily after the injury, and in some cases it is slowly absorbed, while in others it may persist for years. This also suggests some biochemical influence. Pain, and disability in shoulder movements are the principal symptoms, though the latter may be absent in chronic cases. Very often, but not always, the pain is referred to the shoulder as well as the upper arm and may radiate into the forearm, the hand or the neck. In the early stage there may be some slight swelling, due to serous effusion. In most cases, when the patient presents himself there is no swelling. The only tender point the author has constantly found is anteriorly over the lesser tuberosity. Roentgenography is important, but if it shows nothing it is not against the diagnosis of bursitis. He would divide the varieties into acute, hyperacute, chronic, and chronic with exacerbations. The hyperacute refers more particularly to the severity of the symptoms. In acute cases pain and stiffness develop rapidly and reach their maximum in about three days. Chronic subdeltoid bursitis begins in the acute form or is of the same severity throughout, existing for months and years but usually subsiding with or without treatment. The chronic form with exacerbations is explained by the name. Brickner has little confidence in electricity, baking, violet ray, or internal medication, but treats his cases usually by a simple automatic abduction method. The patient is put to bed, supported on several pillows, and his arm is raised as far as he can comfortably abduct it. A towel or bandage sling is passed from the wrist or elbow to the head of the bed, which is raised on blocks or chairs. As he gradually slides down in bed the arm goes up; and it is no rare experience in a patient who has not abducted his arm more than 45 degrees in many months to find it fully and painlessly abducted in two or three days, or even one day. If the patient cannot sleep with his arm in the sling this gradual traction may be made intermittent. When passive abduction is thus obtained, active abduction follows with exercise. As some patients, however, do not recover with this treatment, the author advises operation in cases of the chronic form with exacerbations and in the acute, hyperacute and chronic cases in which this automatic abduction fails. The operation he employs includes the processes of splitting the deltoid, raising the outer wall of the bursa from the inner one and incising it, dividing all adhesions, incising and retracting the floor of the bursa, removing the deposit if extratendinous, or incising the tendon to remove it, suturing tears in the tendons, suturing the inner and the outer wall of the bursa. The reconstruction of the bursal walls is not essential, nor is abducting the arm in plaster of Paris for about a week, but these measures are mentioned as advisable.

Gunshot Wounds of the Knee Joint. J. Campbell and H. F. Woolfenden, *Lancet,* August 11, 1917.

This study is based upon the observation upon 60 cases. The three fundamentals in the treatment of wounds of the knee joint are these: 1. Absolute rest, 2. Perfect asepsis, 3. The use of Carrel's method of wound treatment. Rest is best obtained by the use of the Thomas splint. The Carrel method is employed either through the original wound or wounds, or if the infection is severe through various drainage openings. In making drainage of the knee joints the author insists that posterior incision through the popliteal space is always necessary.

If foreign bodies are present, they should be removed if large, from the joint or if evidence of sepsis is present. If the foreign body is small, is lodged in the bone, or is not attended by signs of sepsis it may be left alone. If it later gives trouble it can be removed. The authors do not approve of excision as a method of treating the sepsis. Of the 60 cases, only 2 died and in only one was amputation necessary.

The Nailing Operation in Ununited Fractures of the Femoral Neck. Paul P. Sweet. *The American Journal of Orthopedic Surgery,* July, 1917.

Ununited fractures of the femur neck are not infrequently due to faulty treatment. This is true mainly for intracapsular fractures and particularly in elderly patients in whom the general conditions forbids prolonged or overnice manipulation of the parts involved. Whitman's method of abdiction serves the excellent purpose of favoring fibrous union in these old and ofttimes debilitated people, yet in some instances this procedure can yield a good result and for these cases Swett suggests nailing of the separated fragments. There must be bony opposition of these fragments and complete immobilization; these ends are attained by nailing. This nail method is not meant to replace the Albee method of autogenous bone peg but it may serve as a very vailable procedure when a more time consuming technique may not be advisable.

Cholecystostomy Versus Cholecytectomy. Miles F. Porter, Fort Wayne, Ind. *Journal of the American Medical Association,* August 18, 1917.

The gallbladder has an important function in all animals whose digestion may be said to be intermittent rather than remittent and continuous. Its removal or obliteration in man and animals leads to dilatation of the bile ducts, and the effect on the pancreas of the increased pressure of the bile within the ducts has been amply demonstrated. Deaver says that the gallbladder has important functions to perform, of which the chief are to equalize the pressure of bile in the ducts and to secrete mucus which shall dilute the bile. With all the facts we cannot accept Moyniham's dictum that the gallbladder has no useful purpose whatever. If one could say postively in what proportion of cases the gall bladder is the principal or sole cause of gallbladder disease, we could see much more clearly to a decision between cholecytostomy and cholecystectomy. Authorities are quoted by Porter as to the bad effects of infection from the bile passages in pancreatic disease and also as regards the effects of the two operations respectively. There are those who believe that cholecystectomy is the operation of election for gallstone disease, while on the other hand those like Ochsner and Deaver, who maintain that cholecystotomy is the operation of choice, and still others of equal experience and skill who take the middle course. One is forced to the conclusion, therefore, that the difference is accounted for by the different pathologic conditions that are met. The danger of overlooking stones in the common duct should be constantly borne in mind. A stone in the common duct with the gallbladder retained is not so great a menace as a stone in the common duct after a cholecystectomy. The important question to decide is whether in a given case surgical treatment is called for at all, and if so what particular kind of surgical procedure suits the case.

A Consideration of the Causes of Recurrent Symptoms After Operation for Gastric and Duodenal Ulcer. Abraham O. Wilensky. *The American Journal of the Medical Sciences,* September, 1917.

Wilensky points out that the surgical treatment of gastric or duodenal ulcer does not end with the dismissal of the patient from the hospital when his wound has healed. Instead it should be followed by a continued period of after-treatment over many months. These patients have had associated lesions in the ulcer-bearing are as well as the ulcer itself and these lesions may produce post-operative symptoms even when the ulcer is removed.

The most frequent symptoms are due to functional disturbances—vomiting, pain, pyrosis and gaseous eructations appear and they may all be controlled by proper diet and systematic gastric lavage. Also disturbances of the stomach, acidity, post-operative atony of the abdominal viscera causing constipation, post-operative changes in the gastric and intestinal juices providing diarrhea—all these factors require treatment and regulation.

In addition there are symptoms due to anatomical disturbances following operation. Faulty suture work, or cutting through unabsorbable sutures may cause symptoms of pain. Finally there is a group of patients in which symptoms are due to anatomical changes in the neighboring tissues. Thus, for example, herniae in abdominal scars may simulate stomach ulcer pain; intra-abdominal adhesions or lesions in the spinal canal may make it difficult indeed to distinguish the pain from true gastric ulcer pain.

The recurrent ulcer may be responsible for persistent post-operative symptoms; however it is essential to exclude definitely all other conditions which may produce the clinical picture of pain, vomiting, eructations, etc.

Incompetency of the Ileocecal Valve vs. Lane's Kink as a Cause of Ideal Stasis. J. H. Kellogg, Battle Creek, *Medical Record,* September 8, 1917.

As the result of the X-ray studies of Case and the results obtained by operation, Kellogg believes that the cause of ileac stasis lies in an incompetency of the ileo-cecal valve rather than to the kink discovered by Lane. He believes that the Lane kink is nothing but an embryonic structure and without significance. The various other membranes and adhesions found in the ileo-cecal region are probably due to a localized slow peritonitis due to the stasis in the ileum. Kellogg says that the evidences of incompetency are found at operation by his being able to force gas by pressure from the cecum into the ileum. In such cases as a rule, the terminal portion of the ileum is found to be distended to twice or more the usual diameter; furthermore it is thickened. It must be remembered that the cause of the incompetency is some obstruction lower down in the colon, usually adhesions of the pelvic or ileac colon. Sometimes, a neoplasm is found or a tubercular or syphilitic ulceration. Short circuiting of the bowel as practiced by Lane is usually attended by a recurrence of the symptoms. On the other hand, Kellogg's operation, consisting in restoration of the ileo-cecal valve and removal of the distal obstruction is attended by complete cure.

Local Anesthesia in Sixty Operations for Acute and Chronic Appendicitis. Joseph Wiener, New York, *New York Medical Journal,* August 25, 1917.

Of the 60 cases, 41 were chronic and 19 acute. Wiener uses a 1% solution of novocaine to which some adrenalin is added. This is first injected into the skin, then into the deeper tissues. After dividing the skin and subcutaneous tissues more solution is injected into the internal oblique and aponeurosis of the external oblique muscles. These are then split with the knife (McBurney incision), The peritoneum is then injected and opened. Before removing the appendix a little solution is injected into the mesenteriolum so that the pain usually attended in dividing this structure is abolished. No packings are used whatever. The closure of the structures is not attended by pain. Wiener says that his patients do not suffer nearly as much with distention as when a general anesthesia is employed; also the nausea and vomiting is less; they require less opiates, and convalescence is much hastened. There was no mortality in these 60 cases.

The Silent Common Duct Stone. Daniel N. Eisendrath. *Medicine & Surgery*, July, 1917.

Eisendrath emphasizes the fact that calculi may be present in the hepatic or common bile ducts with no clinical or palpatory evidence. He quotes Kehr's indications for opening the common duct even though palpation be negative. These indications are: (1) if the pancreatic head is enlarged or thickened, (2) if the common duct is dilated or thickened, (3) if there is a history of jaundice, chills, fever, (4) if the gall bladder contains many small stones.

Following these rules Eisendrath incised the common and hepatic ducts in 36 cases in which palpation were negative; in 12 cases calculi were found on exploration and the author therefor feels that Kehr's advice is valuable. Eisendrath claims particular importance for (2), (3), and (4) as indicators and to these he adds another, viz., recurrence of pains or symptoms of cholangitis after operations such as drainage or removal of gall bladder.

The Endocrine Function of the Pancreas and Its Relation to the Sex Life of Women. A. J. Carlson. *Surgery, Gynecology & Obstetrics*, Sept., 1917.

The pancreas exerts the specific function from all evidence at hand, of secreting a substance into the blood for the utilization of sugar by the tissues. In the absence of the pancreas the power of the tissues to oxidize sugar is lost, and the hypo, or hyperfunction of the other endocrine glands which have the faculty of altering the sugar mobilization (adrenals, thyroid) cannot replace that specific sugar function.

Other conditions as acidosis, lipaemia, increased metabolism are probably also dependent upon pancreas function. True diabetes mellitus in man is primarily the result of pancreatic deficiency. There is at present no organotherapy of diabetes, experimental or clinical.

No specific relation between the pancreas as an endocrine gland and the gonads male or female has so far been established. Absolute diabetes probably renders conception impossible, while if induced after conception leads to death of the foetus. Partial diabetes under dietary control permits of normal sex life of women (menstruation, normal pregnancy, normal child, lactation), and pregnancy under such conditions does not aggravate the diabetes. But in the absence of such dietary control the condition of pregnancy aggravates the diabetes in the mother, and uncontrolled diabetes in the mother is extremely injurious to the foetus. There is some evidence that in late stages of pregnancy the foetal pancreas may function for the mother.

Transplantation and Retention of Various Tissue after Hysterectomy. William P. Graves. *Surgery, Gynecology & Obstetrics*, Sept. 1917.

Specific surgical menopause symptoms consist chiefly of vasomotor disturbances in the form of hot flushes. After extripation of the uterus, vasomotor disturbances ensue with approximately equal frequency, whether the ovaries be retained *in situ*, totally ablated, or transplanted. Retention of ovarian tissue after hysterectomy is of little or no physiological value and may be productive of serious harm to the patient. Theoretically the menopause vasomotor symptoms are due to a break in the utero-ovarian functional harmony, by which the physiological balance of the glands of internal secretion is upset with consequent dysfunctional activity.

Uteroscopy versus Transperitoneal Hysterotomy. Alfred Heineberg, Philadelphia. *American Journal of Obstetrics*, August, 1917.

Uteroscopy according to the author is superior to the transperitoneal hysterotomy in that it affords a perfect view of the interior of the uterus without subjecting the patient to the dangers attendant upon the invasion of the peritoneal cavity. It may be performed quickly under nitrous oxide-oxygen anesthesia. No more pain or discomfort is experienced by the patient than after an ordinary dilatation or curettage; it also affords a clear view of the cervical canal as well as of the uterine cavity.

Hemostasis by Interposition of Muscle, Fat and Fascia in Parenchymatous Organs. Edward H. Risley. *Surgery, Gynecology and Obstetrics*, January, 1917.

From his experiments on dogs, Risley has come to the conclusion that in bleeding from parenchymatous organs as liver and kidney, which is otherwise not readily controlled, the interposition of a piece of voluntary muscle will effect quick hemostasis. The further effect is fibrous union of the wounded organ. The piece of muscle tissue is best taken from the patient's own body at time of the operation. It should preferrably be joggedly cut by a knife and not crushed as with scissors, cut so as to ensure the pouring out of blood platelets and plasma. No salt solution should be used, as it interferes with the hemostatic properties of the muscle tissue. Fascia and fat also act as hemostatics, but to a limited degree. These tissues must always be sewn in, while muscle need only be inserted with gauze pressure; fine .00 catgut sutures may insure permanent interposition.

Some Principles of Plastic Surgery. J. L. Ayward, *Lancet*, September 1, 1917.

Ayward emphasizes three points: 1. That the skin incision instead of being perpendicular to the surface should be oblique. 2. The importance of mobilizing the subcutaneous fat beneath the incision so that there shall be no subsequent depression. This is done by peeling the fat away from the subjacent tissues so that its only blood supply shall come from the skin vessels. 3. The use of mattress sutures in order that there shall be a broader apposition of their surface. Michel clamps accomplish the same end but are not applicable on the face.

Some Statistical Results of the Treatment of Chest Wounds. T. R. Elliott, *Lancet*. September 8, 1917.

1. A sterile hemothorax of moderate size, that is, of about 30 oz., will recover as rapidly by natural absorption as by aspiration.

2. The retention of foreign bodies in the chest in aseptic cases does not appear to exert any crippling effect for military service, but more accurate information is urgently needed on this point.

3. Cases of infected hemothorax that have been drained in France and transferred to the United Kingdom generally recover rapidly and completely. None die, and subsequent operations are rarely needed. More than one-half of these empyema cases can be returned to duty.

4. The late mortality from chest wounds is practically nil in England, and it is only 5 per cent on the lines of communication in France; but in the area of the armies it is higher than was at first supposed. About 10 to 15 per cent may die in medical units at an early date from the severity of the injury and about 10 per cent may die later at the casualty clearing station from complicating sepsis.

5. Among those casualties which develop sepsis within the chest the mortality is very high, rising to nearly 50 per cent under the present system of treatment by rib resection and drainage.

6. The old conservative routine of surgical non-intervention, except by late drainage, finds its justification only in the satisfactory recovery of those cases of gunshot wound of the chest which remain non-infected—that is, about 75 per cent. The high mortality in those which develop sepsis demands a wider practice of the new prophylactic method of cleansing operations, performed at an early hour on certain carefully chosen groups of cases.

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HEALING OF LOWER JAW BONE DEFECTS IN WAR CRIPPLES.

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The free transplantation of tissue is now in its glory. When reading current magazines and surgical periodicals one gets the impression that many surgeons strive for a maximal application of free transplantation. This may be explained by the imposing effect of this proceeding, and it looks as if not only would a difficult problem be thus solved—which indeed is the case—but as if it were now the universal welcome resource in every case of need. With the greatest possible recognition of the principle that during late years has made its glorious entry into practical surgery through masterly free transplantation—and here I think in the first place of Lexer's work—I yet protest against the measureless exaggeration of its application, especially in skull and jaw surgery. One gets the impression from the publications that a bone or dura defect must be freely covered with a free transplantation, without taking into consideration for a moment a local plastic with pedicle. A free transplantation is very fine, but nevertheless it is only a makeshift, when no way is possible to carry out a plastic with pedicle. On principle I apply the free transplant only in such cases where another method is practically impossible. In contrast to the work published everywhere I was comparatively seldom obliged to make use of the free transplantation—nevertheless I follow the free transplantation of others with the greatest attention; but already fear that a relapse will take place in this fashionable procedure which will thrust it back into the right path.

I shall here say no more about the free substitute for dura or cranial bones, but speak only of the jaw substitute from tibia, rib, clavicle, and iliac crest. The theoretical side has lately been developed, treated and discussed everywhere; but one thing is certainly to be concluded from this, that this theoretical way is neither simple nor sure.

The following questions await their answer: On theoretical principles, for example, is a bone substitute from the connective tissue group, the clavicle, etc., to be used, or is one from the cartilage group, as the rib, to be preferred?

How great is the importance of the periosteum and the marrow, and is it desirable to cover the bone entirely with periosteum or should the marrow cavity be open and must the periosteum be slit, everywhere or not at all?

Notwithstanding the many fine histological researches and experiments on animals, it is even yet difficult to explain ideal, definitive healing. How far are the latter to be considered as real persisting transplants, and how far as new formation of bone?

Is the new formation of bone dependent only on the periosteum and marrow of the fragment, or also on the implanted periosteum or on the implanted marrow, and if from all, how are the parts divided, and in what proportions do they quantitatively stand to each other?

If the implanted bone is entirely absorbed, does this favor the formation of bone, and in what way?

Do the disappearing bone cells supply material for bone formation or do the disappearing cells incite an immediate growth to present a vacuum forming?

As we see there is very much in this sphere to be solved by experiments, and it is better, surer and more justifiable if we surgeons, for the present, concentrate all our energy on the study of *practical results.*

This is our duty in this difficult position, and thereby we may not allow our sympathies or antipathies to interfere. Objectiveness should be the word. I fear, when I consider the extraordinary enthusiasm of some operators, who perform the free bone plastic wholesale, that they unconsciously allow themselves to be carried away too much by apparent results, to accept their conclusion as mathematically correct. Is it impossible that the following is what takes place? The transplant with perfectly cylindrical or conical pegs constructed at its ends is fixed between the ends of the fragments and by many surgeons even strongly wedged in. It is clear that with this and with the dental splint carefully put in order before the operation, and maximally functionating a certain cohesion appears. Then all around a reaction with maximal activity and production of tissue is developed for, first, the operation itself produces this, and secondly, in the immediate vicinity of the mouth cavity no absolute aseptic result is to be thought of, for we must consider that the receptacle for the bones here and there is only separated from the inside of the mouth by the mucous membrane, and this alone does not give an absolute seclusion, but is at best a filter through which the bacteria can wander. The implant also, certainly in the beginning and perhaps continually, is to be considered as alien to the surrounding tissue and excites it to attempts at expulsion. All this together produces in the deeper tissue an increase of pressure, spanning of the fasciæ and the skin; this increases the immobility and the subjective and objective feeling of rigidity, which is often mistaken for callous formation.

As these conditions disappear they are followed by an actual connective tissue development, which manifestly remains, closing more and more together and so presenting a delusive apparent solidification of the fracture.

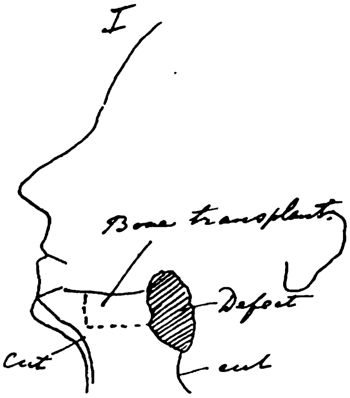

Fig. 1.

In favorable cases a decisive moment now arrives. Through the present immobilization an ideal condition for healing the fracture is created, also because the bed has been previously prepared for the bone inlay, the surrounding connective tissue removed and an exceedingly intensive enlivening of the bone fragment ends had taken place.

Now the bone ends begin to work and produce new bone cells ad maximum, fixing the implant more and more, growing around and through it and often a production and activity of periosteum remnants of the missing bone piece completes it.

In my opinion this last factor plays a great rôle in the definite absolute healing of the free bone transplantation. This is supported in the many cases of spontaneous late healing after many months in rather large bone defects of the lower jaw.

However it may be, whether in these cases the transplant itself fully disappears or not, the operation leads in such cases directly or indirectly to a fine result. In my opinion this success is far from being met with as regularly as is supposed by surgeons; it forms rather a comparatively small percentage of the operative results.

In most cases another procedure is to be assumed: After the operation the case looked well, the transplant is "healed" like a foreign substance. The procedure described with reaction and late connective tissue development has beautified the picture, but the absorption process in the implant begins to take such large dimensions that the new formation of connective tissue, with its shrinking and with the new bone formation through the periosteum of the fragments and the periosteal islands no more equals the loss occasioned by the absorption process or the new bone production forms no firm connection between the adjoining pieces and there remains a pseudarthrosis on one or both sides of the transplant.

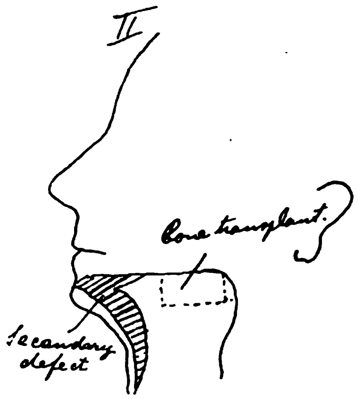

Fig. 2.

That this takes place before the transplant is distinctly absorbed in the center is to be explained because the transplanted cells in constant compressed contact with the fragment ends are more easily absorbed. As the whole absorption is a very slow process I have repeatedly observed in such cases that the operator often believes that through some outward power the pseudarthrosis has arisen and that this is in no way a bad sign—the more so when this pseudarthrosis does not increase; on the contrary the absorption process advances continually but very slowly and is often overtaken by the growth of bone or quicker connective tissue development which latter again transitorily fixed the pseudarthrosis, helped, too, by the fact that the surgeon had ordered, after noticing the pseudarthrosis, a new dental splint.

The apparent consolidation is really only a temporary fixation. The view of these cases is made difficult by their long duration and, besides, by the frequent transportation of the patient (soldier). I believe we can judge of the definite bone juncture of a free transplant in large defects only after a year, or perhaps even then not with certainty. One can accept as evidence of complete healing only the fact that the patient is again capable of masticating without a splint.

Until the final results of the free bone transplantations are settled I prefer to apply when possible a local plastic as this must mathematically give the best chance.

It is still clear that in all operations the greatest economy must be observed with all the nourishing vessels, and it would be wrong to deliberately use a free bone piece without any vascularization connection when one has a richly pedicled bone piece at his disposal.

In my operations (Figs. 1 to 5) the bone piece that had to be placed in the defect was moved with a flap that contained all its soft covering parts (skin, muscles and periosteum) similar to the lower jaw plastic of Bardenheuer (communicated by A. Wildt in *Zentralblatt für Chirurgie,* 1896, Nr. 50) and still more like that of Krause (*Lehrbuch der chirurgischen Operationen,* 1914). In my operations I never used metal suture of the bone or wedges, but only three thin catgut stitches of the periosteum and then very strong suture of the soft parts and skin. The full thickness has in addition to the principal purpose of supplying the ideal nourishment of the bone also the important practical consideration of cosmetic result. With war cripples there is nearly always a sunken scar over the bone defect and in preparing the bone ends and the bed of the inlay still more connective tissue is removed. The introduction of the soft parts is therefore very desirable here. It provides not only a good filling with beautiful esthetic form, but also the possibility of active movement for chewing and laughing. The secondary defect is closed everywhere by sutures, in contrast to Krause. Besides he worked under far more favorable circumstances in civilian practice after jaw resections without old inflammation centers with surrounding scars.

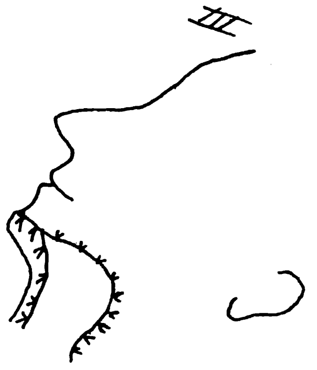

Fig. 3.

The incisions differ according to the case. First the scars of the skin and soft parts were entirely cut out without regarding the size and shape of the consequent defect. Further I used the central or the peripheral bone fragment to take off the bone piece according to the greater size of the one or the other fragment, for one often finds quite pointed, atrophied, unfavorable fragment ends.

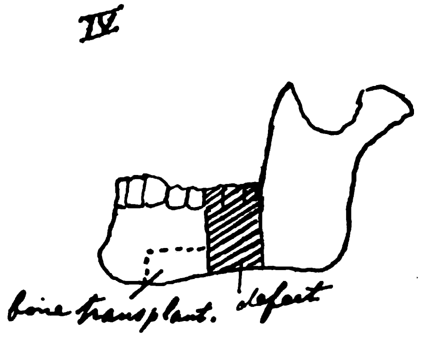

Fig. 4.

The skin cuts I made otherwise than Krause. In every case after freshening the fragments I ascertained the length and shape of the bone defect in order to be able to choose the substitute with the same conditions. Then I cut along the upper edge of the chosen piece to be removed, as far as the bone; prepared the upper wound edge with periosteum about one-tenth of an inch and lengthened this cut an inch in its direction. I then cut a slight curve backwards nearly to the outermost edge where I wished to separate the bone and then prepared this pointed inch-long flap, with soft parts, up to a vertical line one-third of an inch from the bone separating line and here cut the periosteum which was made free to the vertical line where the bone was to be separated. Now a dentist with a very long dentical fissure borer separated the bone piece entirely or only two-thirds deep, in the latter case I split with the chisel the outer thicker part of the bone and left the inner bone part for greater solidity, but especially for raising and leveling the soft parts to a beautiful shape. In Vienna in some

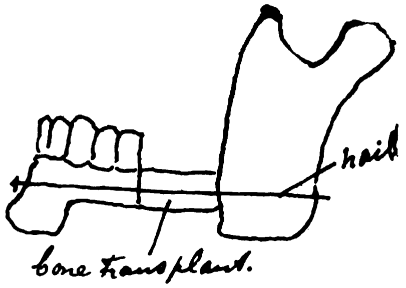

Fig. 5.

cases I had the assistance of Prof. Weiser; in others that of Dozent Klein, to which gentlemen I am extremely indebted for this difficult and important part of the operation. Now the curved cut was prolonged vertically downwards so far as necessary in order to be able to place the piece in the bone defect. The periosteum which is a little longer than the bone is then sewn with fine catgut to the adjoining periosteum under the raised flap. And then the bone is fixed in its new position by several strong, firmly drawn, silk stitches of the soft parts. The secondary defect is also completely sewn together, contrary to Krause. The pointed flap in conjunction with the pedicled bone piece and its secondary defects give far more favorable conditions than with Krause. Firstly, the bone end, which by Krause often remains open, is not only covered, but also remains free from suture covering, and is protected by the pointed flap; secondly, the secondary defect is narrower and longer so that the seam requires less tension which latter is spread over a larger space posteriorly, therefore the result is more beautiful—even when all is sewn together. Only exceptionally I used drainage with very small glass tubes. At the beginning the place of the implantation is prominent and the seam of the secondary defect is indented, but the former levels itself through absorption and muscular work.

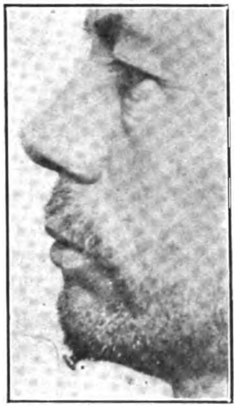

Fig. 6.

I have done only eight such plastics and can give no information of most of the permanent results. It does not make the impression that a united firm underjaw of one piece usable without a plate for mastication can be expected in less than six months.

Some typical cases I shall report in extenso.

In four cases the dentist could not help me, as the back fragment was not fixable by a plate with a pad. As is known, these back pieces have the inclination to slip up and this is prevented by the plate which tries to fix the jaw piece by holding the teeth, but these teeth are often missing or the fracture is behind the last one, and then the imperfect pad must be used to immobilize. At present therefore different extension apparatuses are preferred which operate like those used in extremity fractures by drawing with perforating nails the bone ends to the right place. The different apparatus of this system are rather complicated and unsure, although they often work better than the pad of the plate, especially when the plate itself also does not find a good hold on the teeth. I made use of a somewhat bold-looking but rather easy and sure fixture, which had the advantage of a direct and complete immobilization—as it practically and mathematically makes any movement of the pieces under each other impossible. It is especially of great importance where no assistance in the inside of the mouth can be got and the inclination to dislocation is very great. The procedure is as follows: After a minimum incision of one-third of an inch medial of the foramen mentale the compacta of the jaw is bored through towards the back in the axis of the three pieces of the jaw to be joined, then a strong nail about 4 inches long is pushed in; three times I used ordinary carpenter nails, another time a surgical steel nail without head. (Figs. 6 and 7.) The left forefinger and thumb hold the three jaw pieces and give good information for the correct direction of the inserted nail. It is particularly important for the bored entrance for the nail to have the right axis; the rest easily follows. A shattering of the jaw I could never prove, even with Röntgen rays.

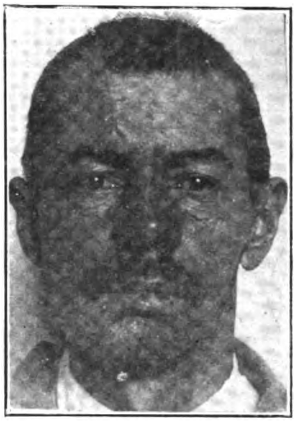

Fig. 7.

The entering of the nail is rather easy, because it searches its further way in the spongy tissue and sooner turns the pieces in the fingers than enters the compacta. Only at the end of the jaw it must perforate the vertical jaw side, but it does not matter, on the contrary it helps the fixing considerably if the end of the nail goes through the compacta. The hammering must be performed by a great number of very gentle blows. Twice when I had left the carpenter's nail head outside the skin the nail fell out, once after five, and once after three weeks. In both cases it had done its duty, as in both cases, helped by the plate, an immovable jointure was present.

Of the eight jaw injuries now, after five months, two are perfectly immovable without frame and usable for strong mastication. In both cases a defect of about an inch existed. In another case a rather complete consolidation followed (three months) in three cases only on one side so far.

The last patients cannot be judged, as the time after the operation is too short.

The most important thing, however, is that in no case did the bone piece necrose or was a sequestrum ejected, though in four cases a sero-purulent fistula appeared, which in two cases stretched along the skin perforation nail and only ceased when the nail was removed; in one case it appeared only two months after the operation—in this case the head of the nail was covered with skin. In the fourth case no nail was used, the fistula appeared on the third day and spontaneously disappeared after a week. In all the Röntgen pictures the bone piece is well preserved; they show in the case where the covered nail was removed a distinct absorption process in the nail bed of all the three perforated jaw pieces.

Taken altogether, up to now, it may be said that this method used in unfavorable cases produced satisfactory results, but nothing more. The results have at most shown that where practically applicable the local plastic was more suitable than could be expected of the free transplant, as a resistance and survival of the free transplants over the suppuration can be almost excluded.

Anesthetics.

Every carpenter works best with his own tools. The record of 50,000 etherizations at Mayo Clinic without mortality is unparalleled. The 35,000 nitrous-oxid oxygen anesthesias at the Lakeside Hospital without a death is a wonderful achievement. The statement that massive local infiltration is harmless hails it as the coming anesthetic procedure. And yet almost daily deaths under ether or directly traceable to it occur. My personal observation has convinced me that nitrous oxid in any efficient combination is a dangerous anesthetic for prolonged operations. And the desperately ill die under our hands or shortly afterward with novocain infiltration.

ACUTE OSTEOMYELITIS OF THE CLAVICLE.

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Osteomyelitis of the short and flat bones is of very much less frequent occurrence than osteomyelitis of the long or weight-carrying bones. The statistics of E. Frohner,[1] based on a series of 545 cases of acute osteomyelitis, show that about 27 involved the short and flat bones, or about 8.2%. The clavicle occupies a position midway between the short and long bones. Histologically its structure resembles that of a short bone. The shaft, as well as the extremities, consists of cancellous or spongy bone invested by a compact layer much thicker in the middle than at either end. This arrangement insures a good blood supply and quite frequently there are two foramina on the posterior surface, or one on the posterior and the other on the inferior surface, which transmit its nutrient arteries. On the other hand, because of its shape and function it has a great deal in common with the long weight-carrying bones. It acts as a fulcrum to give lateral motion to the arm, it is subjected to traumatism more frequently than any bone in the body (being the bone most frequently broken[2]), and its rapidity and activity of growth at certain periods is as great as that of long bones. The great bulk of bone infections occur in long bones at points where growth is most active and rapid, e. g., the lower epiphysis of the femur and the upper epiphysis of the tibia, because here, owing to the new formation of bloodvessels and the consequent disturbed circulation infective material readily finds lodgment. Infectious processes, when once established, are more intense and destructive in long bones, because of the poor blood supply of the compact bone which offers little resistance to microbic invasion. The clavicle, while structurally a short bone with a generous blood supply, but in many respects resembling the long, is the most frequent of the bones classified a short or flat to become the seat of osteomyelitic infections. In a collection of 104 cases of osteomyelitis of the short and flat bone E. Frohner[3] found 14 involvements of the clavicle, 5 cases coming under his own observation. P. Klem[4] in a series of 320 cases of osteomyelitis found the clavicle, sternum and ribs, to be the seat of infection 11 times or 3.4%. In this same series Klem found 366 bones involved, of which 7 cases were of the clavicle.

Osteomyelitis of the clavicle is essentially a disease of childhood and in that respect resembles osteomyelitis of other bones. However, it occurs quite frequently in infants and a number of cases have been reported in adults. The explanation of this may lie in the fact that ossification of the shaft of the clavicle takes place early (13th day), earlier than any other bone in the body, while ossification of the sternal end does not occur until the 25th year. As etiological factors, traumatism and infection through lymphatics from the upper extremities, also play important rôles. The clavicle is often involved simultaneously with other bones, or it becomes infected subsequently. Thus, in 87 cases of osteomyelitis with foci in various bones (multiple osteomyelitis), P. Haage[5] found the clavicle involved three times.

The pathology of osteomyelitis of the clavicle differs somewhat from similar infections of long, and also of short and flat bones. Infections of short or flat bones are usually not as serious as those of the long because owing to the blood supply, the short and flat bones offer more resistance to microbic invasion, and the extent of destruction is not nearly as great. They may assume serious aspects when the vertebrae or the bones of the skull are involved, because of their contiguity to important structures. But as a rule the tendency of the inflammation to spread and destroy is not nearly so rapid or intense as infection of the long bones. Hence, we frequently see in short and flat bones foci of infection without necrosis or with very little destruction. Even where there is some destruction of bone there may be a low grade of inflammation, side by side with reparative changes. If sequestra form they are usually small. Repair of damage also takes place much more rapidly than in the long bones, and the general symptoms due to absorption of toxines are not very severe. In infection of the clavicle, however, all grades of inflammatory processes take place. from the most virulent and destructive types with necrosis of the entire bone and grave general symptoms or even death, to the mildest type with only little or no destruction of the bone. At times the inflammatory changes may be so mild and the necrosis so slight that the reparative processes keep pace with the disease, and the bone remains practically intact. Such bones of course appear inflamed, and enlarged, lose their shape, and often become osteoporotic. This process, if limited in extent, may terminate in recovery with only slight necrosis, but exacerbations of the inflammation may take place and the whole bone may become involved and the disease prolonged indefinitely.

The observations of the bacteriology of acute osteomyelitis of the clavicle have not been as numerous, as those of infections of the long bone, for obvious reasons. These observations in the main, however, indicate that the staphylococcus aureus is most frequently found in the clavicular lesion. This corresponds with the finding in osteomyelitis of the long bones. In some cases, which I have collected from the literature the staphylococcus albus and streptococcus have been found. It is probable that any of the organisms that are frequently or only occasionally found in osteomyelitis of the long bone may also at times be responsible for infection of the clavicle.

The symptoms of acute osteomyelitis of the clavicle are as a rule fairly constant, and the diagnosis is easily made. The clavicle is a superficial bone and can be easily palpated, throughout its whole extent; therefore any acute inflammation involving any part of it can, as a rule, be readily detected, and in the majority of the cases, reported, the symptom-complex was characteristic; when the clavicle is only one of a number of bones involved, acute articular rheumatism is somewhat simulated but a careful examination readily excludes this disease. Where the infection is not so acute and where reparative changes have been going on for some time, the signs and symptoms may not be so frank and the diagnosis not so apparent. In this class of cases, bone tumor, bone cysts, and rhachitis and such chronic infections as tuberculosis, syphilis, etc., must be excluded either by physical examination, Röntgen ray, or by special test, Wassermann's luetin, von Pirquet's, etc. In some cases the diagnosis may not be cleared up until the whole or part of the bone has been resected, and submitted to a microscopic examination.

Since Nichols'[6] monograph in 1904, in which he demonstrated that the rational treatment of acute osteomyelitis was the complete removal of the diseased bone with subsequent infolding and suture of the periosteum, thus doing away with the long and tedious convalescence incident to the healing of large bony cavities, the treatment of osteomyelitis of the clavicle has also been simplified, but here again the indications for treatment are not identical with those of infections of the long bones. In long bones the first consideration is to conserve the patient's life and to prevent, if possible, further destruction of the bone tissue by early drainage of the medullary canal, and latter to remove the bone. In the clavicle also the first indication for treatment is to save the patient's life, but because of the structure of this bone, effectual drainage is not feasible and therefore of no value as a life-saving measure, and the early removal either in toto, or of all the diseased portion of the bone, is indicated, leaving if possible the periosteum intact.

A search of the literature resulted in the finding of sixteen reported cases of acute osteomyelitis of the clavicle. My case added to this series makes a total of seventeen cases. Of these fifteen recovered and two died, a mortality of 9.24%. Of these, twelve were males and five were females. The majority of the cases occurred between eight and sixteen years, although quite a number of cases reported occurred in the very young and in adult life. As etiological factors, traumatism played a part in about a quarter of the cases reported. Infection of the upper extremities was present in about 10% of the cases. The symptoms are those of a severe inflammation of the clavicular region, accompanied by fever and prostration, and terminating in necrosis of the whole bone with the formation of an abscess and fistulous opening; in the less acute cases, limited necrosis with abscess formation and fistulous openings or enlargement of the bone with osteoporotic changes terminating also in caries of a greater or lesser degree. The operative procedure most employed has been total resection of the clavicle with preservation of the periosteum, although in some cases partial resection or sequestrotomy has been followed by good results. Klem believes that a total resection should always be resorted to in cases of osteomyelitis of the clavicle because it is frequently impossible to distinguish healthy from diseased bone and recurrence of the disease cannot follow a total extirpation. The results of this total resection have, as a rule, been good; the bone regenerates with less deformity than if a sequestrotomy is performed at a later period.

To illustrate some of the various phases of the disease with which we are dealing, I shall cite four cases somewhat in detail. The other cases are interesting and instructive, but owing to the lack of space can only be tabulated.

CASE I. Reported by P. Klem.

K. D., 1 year old. Eight days ago an abscess suddenly appeared in the right side of chest over the clavicle. This abscess was opened by the attending physician about the fifth day. A few days later pain and swelling over right femur. The right clavicular region is swollen, the skin over it is reddened, and in the center a secreting wound can be seen. The right thigh is very much swollen in its upper third, and very painful. Temperature 104°. Operation: whole clavicle necrotic and resected in toto; right thigh incised, much pus evacuated and rough bone could be felt with probe. Patient was in a very poor condition and hence nothing further could be done. Death four minutes after operation.

Remarks by the operating surgeon: The above case illustrates the bad results that may follow promiscuous incision without diagnosis. If the clavicle had been extirpated a few days earlier it might have been possible to save the child's life.

CASE II. Reported by E. M. Nichol, October 17, 1902.

Italian laborer, aged 20 years. About five or six days ago the patient received a blow over the right collar bone. A few days later the sterno-clavicular joint became painful, swelling and redness rapidly increasing. Over right sterno-clavicular articulation, a painful fluctuating swelling, two inches in diameter, was palpable. All motion of the shoulder and arm painful. October 29 an incision about three inches long was made along the inner end of the clavicle, starting from the outer margin of the sternum, an abscess of the soft tissues was opened, which discharged about two ounces of pus. The periosteum was stripped completely from its attachment to the inner two inches of the clavicle. It was thickened and injected and showed no bone in its deep layer. The cartilage of the proximal end was loosened. The inner end of the clavicle itself was soft and friable and contained pus. The sterno-clavicular articulation was freed and the periosteum reflected from the inner two inches of the bone. The bone was then sawed across and the inner two inches removed. The abscess was cleaned out as well as possible, and the periosteum infolded, the edges being approximated by means of catgut. Wet dressings and a Velpeau bandage applied. Histologic sections show osteomyelitis, cultures, staphylococcus aureus. Recovery in eight weeks.

CASE III. Author's case.

O. H., aged 8 years. For six months the patient had suffered with rheumatic pain in various parts of the body, the feet and knees being particularly involved. The parts were swollen and reddened. About two weeks ago the right clavicular region became painful and swollen. Examination: Temperature 103°, pulse 120. The whole clavicle symmetrically enlarged and tender. Leucocytosis of 16000. Operation July 4, 1916: Incision over long axis of clavicle, down to periosteum. Incision of the periosteum and evacuation of a small abscess in middle third of the clavicle. The periosteum was found very much thickened and reddened and stripped readily from the bone which was involved throughout its entire length. It was resected subperiosteally in the following manner:

After separating the periosteum all around the bone for some distance at its middle by means of a curved elevator, it was sawed in two with a Gigli saw. The fragments were then grasped by their sawn end, the inner one first and by elevating, it could be easily separated for the greater part from the periosteum by blunt dissection and by cutting, when necessary, against the bone. It was then carefully disarticulated at the sterno-clavicular joint. The outer fragment was separated in a similar manner and disarticulated at its acromial attachment after first dividing the coraco- and acromio-clavicular ligaments. The periosteum was then infolded over a small gauze drain, which was allowed to protrude at the outer end of the wound and was sutured

No.—Reporter.	Initials, age and sex.	Bones accted.	Symptoms.	Diagnosis.	Duration before operation.
1. Hotchkiss, L. V.	10 years, male.	Left clavicle.	Shoulder and pectoral region suddenly became painful and swollen.	Exploratory incision; septic . osteomyelitis.	9 days.
2. Dimham, D.	Adult, male.	Left clavicle.	Abscess of left upper chest.	Exploratory incision; whole clavicle founded denuded.	
3. Nichols, E. H.	P. R., 20 years, male.	Right clavicle.	Six days after a blow on collarbone pain and swelling over sterno-clavicular joint.	Exploratory incision; septic osteomyelitis.	9 days.
4. Klem, P.	D. K., 1 year, male.	Right clavicle.	Eight days before abscess appeared over right clavicle; two days later over right femur.	Exploratory incision; septic osteomyelitis.	8 days.
5. Klem, P.	M. S., 1 year.	Right clavicle.	Large abscess over right clavicle; large swelling with fistulous tract on its apex.	Incision; septic osteomyelitis.	10 days.
6. Klem, P.	M. McS., 12 years, male.	Right clavicle.	High fever and swelling over right clavicle. Region diffisely.	Septic osteomyelitis.	3 days.
7. Klem, P.	A. M., 11 years, male.	Left clavicle.	Sudden onset with high fever and pain in chest; looks like a very sick boy; delirious.	Septic osteomyelitis of left clavicle.	7 days.
8. Frohner, E.	M. R., 16 years, female,	Left clavicle.	Onset with severe pain in left shoulder; painful swelling over right clavicular region; fistulous opening after incision on the fourteenth day; infection of index finger preceded clavicular infection.	Septic osteomyelitis clavicle, almost whole clavicle necrotic.	8 weeks.
9. Frohner, E.	M. E., 8 years, male.	Right clavicle; tibia; left cheek.	Sudden pain over right shin, over sacrum and over right clavicle: abscesses followed by fistulous opening in these regions.	Fistulous opening over left abia and jaw; clavicle thickened and over it two fistulous openings. Spontaneous fracture of right tibia.	
10. Frohner, E.	J. S., 23 years, male.	Clavicle.	After fall on hand pain and swelling of left shoulder with fever.	Middle clavicular region swollen, skin reddened, fluctuation.	8 days.
11. Frohner, E.	S. H., 16 years, male.	Clavicle; right femur.	Followed infection of right index finger. Pain and swelling over right clavicle, sterno-clavicular articulation; pain and swelling over lower part of right femur.	Fistulous tracts in region and clavicle and femur.	
12. Frohner, E.	D. M., 20 years, male.	Right tibia; left clavicle.			
13. Homans, J.	J. S.	Left clavicle.			5 weeks.
14. Klem, P.					
15. Braquerhaye, J.	Louise Q., 10 months, female.	Left clavicle.	Tense collection of pus in subclavicular region.	Acute osteomyelitis of external extremity of left clavicle.	Several weeks.
16. Taylor, R. T.	E. T., 15 years.	Right clavicle.	Followed injury to left tibia; synovitis of knee joint; no symptoms referable to clavicle mentioned.		
17. Jeannel, J.	S. M., 30 years, male.	Right clavicle.		Old osteomyelitis of right clavicle; old suppuration.	20 years.
18. Habhegger, C. J.	O. H., 8 years, male.	Right clavicle.	Pain, tenderness, enlargement of right clavicle, with fever.	Acute osteomyelitis of right clavicle; subperiosteal abscess.	6 weeks.

Date of operation.	Operation.	Duration of post-operative treatment.	Results.	Bacteriology.	Complication.	Other bones involved.	Reference.
Mar. 22, 1909.	Incision over pectoralis major muscle, deep pus evacuated, sharp edges of clavicle could be felt; entire bone with exception of epiphysis lifted out of its bed.		Recovery.		None.	No other bone.	Annals of Surgery, 1909, 50, 488.
1909.	Clavicle removed subperiostially.		Recovery.		None.	Tibia femur.	Annals of Surgery, 1909. 50. 488.
Oct. 20, 1902.	Abscess opened; subperiosteal resection' of inner 2 inches of clavicle.	8 weeks.	Recovery.	Staphylococcus aureus.	None.	None.	J. A. M. A., 1894, vol. 42,
	Incision of clavicle; incision of right thigh.		Death.	Staphylococcus aureus.		Femur.	439-466.
	Clavicle a total sequestrum; removed.		Death.	Staphylococcus aureus.			
	Subperiosteal extirpation of clavicle, which was necrotic.	34 days.	Recovery.	Staphylococcus aureus.			
	Removal of inner two-thirds of clavicle subperiostially.		Recovery.	Streoptococcus.		Femur O S Calcis Hip joint.	
Dec. 27, 1885.	Removal of entire clavicle; periosteum not injured.	21 days.	Immediate recovery. Clavicle removed 3 years later.		None.	None.	Beiträge zur, Klin. Chir., 1889, Band 5, p. 79.
1889.	Removal in toto of necrotic clavicle; sequestrotomy of left tibia.		Recovery with some deformity of clavicle.				Beiträge zur, Klin. Chir., 1889, Band 5, p. 79.
1889.	Removal of two or three sequestra.		Recovery.	Staphylococcus albus.			Beiträge zur, Klin. Chir.. 1889, Band 5, s. 79.
1889.	Sequestrotomy.		Recovery.				Beiträge zur, Klin. Chir., 1889, Band 5, s. 79.
1889.	Recovery followed in one year after spontaneous extrusion of numerous sequestra.		Recovery.				Beiträge zur, Klin. Chir., 1889, Band 5, s. 79.
	Whole diaphysis resected subperiostially; no drainage.		Recovery complete regeneration of clavicle.				Annals of Surgery, LVIII, p. 382.
	Removal of sequestra.		Recovery.				
	Incision of subperiosteal abscess without trephination; external third of clavicle felt bare.		Recovery without fever.				
	Immediate preliminary operation by incision through periosteum from knee to ankle. Upper two-thirds of tibia and acromial end of clavicle curetted.		Recovery.				N. Y. M. J. 1902; 75, 841-847.
Oct. 24, 1888.	Subperiosteal resection of clavicle.	2 months.	Making good progress toward recovery.				
July 4, 1916.		4 weeks.	Recovery with reformation of bone in two months.	Streoptococcus.	None.	None.	

with a continuous catgut ligature; the skin over it was closed with interrupted silk-worm gut. Shortly after the operation a Velpeau bandage was applied and later the shoulder was held in place by a brace. This patient recovered, with regeneration of the clavicle with very little deformity, in about two months.

Remarks: The entire clavicle was much enlarged, but retained its general outline. The periosteum, which was greatly thickened and also very much congested, could be easily separated from the intensely reddened clavicle which showed in the region of the small abscess a very small sequestrum. The rest of the bone was intensely reddened and osteoporotic. Microscopic section showed acute osteomyelitis, the bone being everywhere infiltrated with leucocytes and in numerous places degenerative changes had taken place. Cultures made from the clavicle showed streptococci.

About the fourth day the patient developed a scarlatinal rash, with high temperature and increased pulse rate. This rash disappeared in about a week and was followed by desquamation, an attack that resembled surgical scarlatina as described by Roberts.

The occurrence in the same patient of acute rheumatism, acute osteomyelitis due to a streptococcic infection and, after operation, scarlatina is to say the least significant.

Case IV. Reported by P. Klem.

M. S., aged 12 years. About two days before the child became prostrated with chills, high fever and general malaise and swelling over the right clavicle. The region of the right clavicle was diffusely red, swollen and very painful. The temperature at that time was 39.8° C. The region of the right scapula was also swollen and reddened and from this region along the spinal column a root-like strand extended downward along the spine to the lumbar region.

Operation August 4, 1915: Incision to the clavicle, which was fully denuded of its periosteum. Extirpation of the bone subperiosteally. Although the operation was done three days after the onset of the trouble a septic condition—high fever, chills and great prostration—developed. On about the third day the general condition became very serious; temperature 40° C. On that day numerous staphylococci were found in the blood. On the seventh day patient had considerable pain in the left forearm. In this region swelling and redness developed. Incision and drainage of a small medullary abscess of the distal end of radius on that day.

August 11th: Very much improved, the wounds are beginning to show granulations and the cocci disappeared from the blood.

August 15th: Severe pains in right heal with redness and swelling of that part. Incision of the heal and evacuation of pus was followed by rapid subsidence of all symptoms and the patient steadily improved until August 25th, when the left hip became involved. The patient again became markedly septic and had a great deal of pain and cocci reappeared in the blood. On September 10th the left hip was resected and following this the patient made a rapid and permanent recovery.

Remarks: The above case illustrates the multiplicity of lesions that may occur in this disease and the grave symptoms that may accompany each new involvement.

Bibliography.

1. E. Frohner: Beträge zur Klin. Chir, 1899, v, p. 79.
2. Gray's Anatomy, 13th edition.
3. E. Frohner: *Loc. cit.*
4. P. Klem: Beiträge zur Klin. Chir., 1913, 84, 352-410.
5. Haage: Beit. zur. Klin. Chir., Bd., 13, 49.
6. E. H. Nichols: J. A. M. A., 104, 42, 439-466.
7. J. Homans: Annals of Surgery, 1912, Vol. 53, 357-387.
8. L. Hotchkiss: Annals of Surgery, 1909, Vol. 50, 488.
9. M. Nealton-Bull: Acad. Dem. Par., 1910, 3d s, 63, 316-319.
10. Le Conte R.: Bost. Med. & Surg. Jour., 1911, 164, 771-776.
11. Jeannel, J.: La Provence Medicale, 1909, 20, 431-440.
12. Walton, Albert J.: Lancet, 1908, 174, 155-157.
13. Braquerhaye, J.: Gaz. hebd. de med. et chir, 2e Ser., 1895, 32, 212-248.
14. Roberts: Annals of Surgery, vol. lxiv, p. 203.

Education in Midwifery.

Repeatedly has attention been called to the importance of training in obstetrics. The Council on Medical Education recommends 180 hours on the roster for obstetrics exclusive of the time required for attendance on six labor cases. The Association of American Medical Colleges requires students to witness at least twelve cases and personally conduct three women through pregnancy, labor, and the puerperium under proper supervision. These standards are not remarkably high considering the importance of the subject.

The state standards of medical education and licensure are far from uniform. General criticisms are not published sufficiently to stimulate the State Board of Licensure to establish the types of requirements which are deemed adequate in the foreign lands. Barton Cooke Hirst (*American Journal of Obstetrics,* July, 1916) calls attention to the fact that the women of our country are afforded less protection than is considered necessary in other countries. He rightly lays emphasis on the duty of a board of licensure to protect child-bearing women from mutilation, disability and death, due to incompetent medical attendance.

The inadequacies of our system of training in obstetrics have largely arisen through the antiquated system of establishing the curriculum on the basis of the hourly lecture. Medical pedagogics thus far have not reached the highest plane, and until a proper evaluation of the subjects necessary for medical education is made, it is unlikely that there will be marked changes in the present system. In the meantime, obstetrical teaching must suffer, and, as a result, society constantly faces an unnecessary hazard.—*American Medicine.*

IMPROVED APPARATUS FOR COMPLICATED FRACTURE OF THE THIGH.

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There has been less of amputation and more conservation of limbs in this war than in any previous conflict. No matter how badly shattered the bone may be or how much of the shaft of the bone has been destroyed if the main arteries remain to insure proper circulation every effort is put forth to save the limb. In this effort surgery has made unexampled progress in bone transplantation, bone grafting, bone splicing and the renewal of bone.

With this new order it is only natural that numberless new ideas should have been advanced in mechanical appliances to aid the surgeon to the successful attainment of this object. Many of these suggestions present features of value, but as a rule are too complicated or require special features and conveniences for their application which render them impractical for general use and particularly in front-line hospitals; but among them are some that recommend themselves by simplicity, utility, and ease of application. I present here one of these improvements which offers certain features of fixation combined with mobility which oftentimes is extremely desirable and is simple, both in material and application.

The points of advantage claimed for this apparatus are as follows:

1. Lightness and simplicity of construction.
2. Complete immobility and suppression of pain.
3. Easy and painless transfer of the patient.
4. Change of dressings without removal of the apparatus which will equally permit of operations.
5. Antero-posterior radiographic examination not interfered with.
6. Free massage of the lower limb and active and passive mobility of the articulations.
7. Reduction of the fragments by continuous elastic traction.

MATERIALS.

For the construction of the apparatus one needs plaster of paris, tarlatan, large-sized rubber tubing, adhesive zinc plaster and hoop iron.

The ordinary hoop iron used in France measures 23 mm. wide, 3 mm. thick, and the amount necessary to make the apparatus will not weigh more than three pounds, which, of course, is one of its advantages and forms the chief point of difference and utility of this over other appliances, as it takes the place of the plaster of paris dressing in which the limb has heretofore been incased.

We start with this hoop iron at the antero-superior spine of the ilium and model it along the line of the hip, as shown in Fig. 1, down to a certain point, when it is bent abruptly outward, downward and inward to form a half circle to correspond with a similar half circle, formed by a piece modeled from the crotch of the inside of the thigh, downward to the knee-joint; these circles offer free manipulation and changement of dressings.

Starting with another piece from a point about 10 cm. up on the one just shaped we carry it down to a point 20 cm. below the plantar surface of the foot, bend it square across and carry it up on the opposite side and again about 10 cm. past the end of the piece descending from the crotch. These two ends are now riveted together on each side and this rivet permits of the flexion of the knee joint.

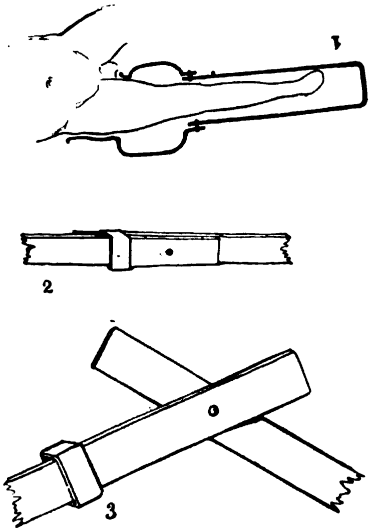

Fig. 1. (After Ducuing.) View of general arrangement of the band iron frame. It is articulated by rivets opposite the condyles of the femur. Fig. 2. Shows the two strips of band iron riveted and held in place by a metal, sliding ring. Fig. 3. The ring is slipped downward permitting play to the articulation.

To prevent involuntary flexion and render the apparatus rigid a metal ring is adjusted to slide from below upward over the two riveted ends, as shown in Figs. 2 and 3.

In the space between the plantar of the foot and the stirrup formed by the banded iron will be arranged the traction in extension upon the limb, as is shown later.

To apply the apparatus first make a plaster spica of the pelvis and upper part of the thigh. That applied to the thigh must form a firm solid collar, as it will be called upon to support firmly the upper extremities of the band iron.

If the lesions of the soft parts are high up they can be covered by the spica and later cut away as may be necessary after the collar has solidified and dried. We insist upon the spica formation. We have never been able to construct a belt that would safely support the necessary traction upon the band iron without it.

The anterior part of the collar surrounding the thigh above the arcade is widened so as to later allow a little flexion of the hip joint.

The making of the pelvic, hip, spica, plaster bandage, ends the work for the first day and it is permitted to dry.

The following day the band iron stirrup is accurately adjusted so that the riveted joints come exactly opposite the articulation of the knee and the two bands or each side exactly upon the same level; then the upper ends are carefully and firmly anchored and caught by aid of plaster bands to the collar made the previous day.

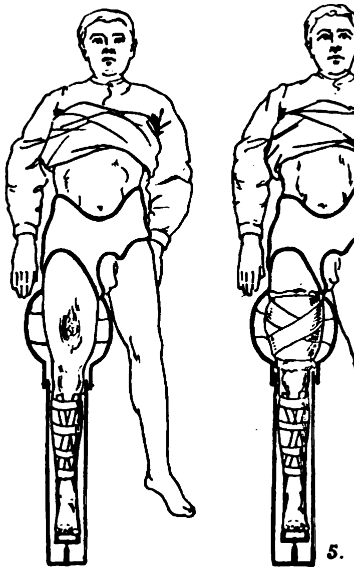

Fig. 4. Shows the application of the hip-abdominal, spica, plaster bandage, arrangement of the permanent elastic traction between the two stirrups below the foot, held in place by the adhesive strips around the lower leg. Fig. 5. The wound is dressed wholly independent of the frame of the apparatus.

Next after sponging the surfaces with alcohol we apply a bandage of adhesive zinc plaster, the superior ends of which, divided, cross over the front of the tibia, as seen in Figs. 4 and 5; then a small, flat piece of wood is placed about midway between the sole of the foot and the band iron stirrup and held in place by a band of adhesive zinc plaster passed around it and fastened to the bandages of the calf of the leg on each side, which in turn are held in place by circular bands of adhesive zinc plaster above the malleolus at the narrowest part above the ankle. These bands must be observed daily as the continuous traction to be exerted upon the wooden stirrup has a tendency to loosen them.

This continuous elastic traction is established by a piece of rubber tubing attached at one end to the metal stirrup and at the other to the wooden one, as shown in Figs. 4 and 5.

The limb is supported and held in position by aid of three strong linen bands attached to the band iron frame; one at the thigh, one at the popliteal space, and the third at the level of the calf of the leg.

When there is a tendency to talipes equinus the foot can be readily held in position by a band placed at a level of the toes and held back by cords fastened to the iron frame each side, as seen in Figs. 6 and 7.

The patient is placed in bed supported by pillows under the hips in such a manner that the limb is held clear of the bed mattress and is supported upon a level with the iron frame of the foot of the bed, thus insuring free play of the elastic traction upon the limb between the stirrups.

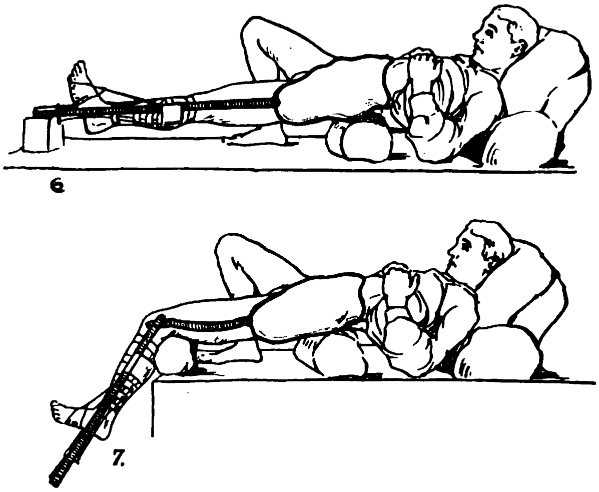

Fig. 6. The patient on the dressing-table shows the independence and ease with which the dressings can be changed. Fig. 7. Active and passive movement of the articulations.

AFTER-CARE.

The dressings can be changed as frequently as necessary without interfering with the apparatus, as shown in Fig. 5, and meantime traction is evenly maintained.

All the necessary operative interference, even to extensive operations, can be performed with the apparatus in situ. The framework does not in any way interfere with antero-posterior radiography and the process of repair can thus be readily followed.

The elastic traction can be readily increased or diminished and without pain.

As soon as the inflammatory conditions have subsided the disposal of the appliance permits of certain manipulations and massage of the limb which aid the recovery and insure freedom of movement. The limited movement of the several joints during the process of repair is of the greatest value to the future usefulness of the limb.

The patient himself can practice flexion and extension of the tibio-tarsal articulation.

The knee joint is slowly and carefully moved each time the dressing is changed.

The attendant places his hand under the popliteal space and gently lifts the joint in flexion. Later when the cicatrization begins and the patient is free from pain he is placed upon the dressing table with a small pillow under the popliteal space as seen in Fig. 7 and without releasing in any way the elastic traction, the flexion and extension movements of the lower limb is regularly practiced. The articulation at the hip can also be moved by the attendant lifting the popliteal space which imparts a slight movement to the hip joint, enough to keep it in activity.

There are four self-evident features of advantage attached to this very simple and easily applied appliance which would seem to recommend it.

1. Absence of the ordinary plaster cast, affording free circulation and air to the skin.
2. Never-ceasing even traction upon the limb.
3. Free examination and operations.
4. Manipulation of the joints at all stages of the repair.

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The Bone Graft.

There has been considerable controversy and discussion as to the part the graft takes in the process of repair of fractured bones. Some claim that it acts only as a scaffolding upon which the osteoblasts have an opportunity to build a new structure, this graft or scaffolding being absorbed when it is of no further use; while by others it is claimed that the graft, to a large extent remains and becomes the main part of the new tissue which enters into the formation of the union. These controversies are interesting, but are of practically no importance. The principal object to be attained is the formation of callous or bone tissue, sufficiently strong to give a weight-bearing and painless bony union. The general consensus of opinion today favors the importance of leaving as much of the undisturbed periosteum and medullary substance attached to the graft as is possible, the belief being that bone formation depends largely on the presence of the medullary substance and periosteum.—**George H. Sexsmith** in *The Journal of the Medical Society of New Jersey.*

AN EXPERIMENTAL STUDY OF PERITONITIS WITH REFERENCE TO CALCIUM SULPHIDE AND SPECIAL REFERENCE TO IODINE AND ETHER IN ITS TREATMENT.*

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Progress is often made by the use of a large amount of time, an imaginative disposition, much energy and unlimited patience.

Laboratory failures may lead to coveted goals upon other avenues. Experiments are not always crowned with success. Defeat is not disgraceful. "Not failure but low aim is crime" (Lowell). "What though the field be lost? All is not lost" (Milton).

The importance of animal experiments have been underrated rather than overestimated. If animal experiments are compared with clinical and surgical practice, there are some points in favor of the former. Beneficial or harmful results are better observed in the laboratory than they are in clinical or surgical practice, since an autopsy is held whether the animal recovers or not; while in clinical or surgical practice, it is necessary for the patient to die before an autopsy is made, and if the patient does die the physician may not be accorded that privilege. Occasionally the patient is re-operated upon and the operative results noted.

Large numbers of cases are required in order that percentage may be obtained, since pathological conditions vary so greatly.

Unfortunately in surgical practice, a certain number of patients are operated upon for peritonitis, and a certain drug used, together with Fowler's position, Murphy drip, and all the other forms of modern treatment. After the cases are reported, doubt still exists as to the value of the drug. In order to ascertain the value of a drug in peritonitis, a certain number of cases should be selected that have the same pathological conditions and which requires the same operation and the drug used in this series of cases. Then if controls are used which are equal in number to those treated with the drug, and the controls have the same pathological conditions, and require the same operation as those cases which are treated with the drug; and if the controls are treated in the same way, with the exception that the drug is not used in them; and then if the results of the two series of cases are compared, some idea as to the value of the drug may be obtained.

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*Experiments personally conducted at The B. Merrill Ricketts Experimental Surgical Research Laboratory. Read before The Academy of Medicine of Cincinnati, April 9, 1917.

During our laboratory experiments I discovered that an aqueous solution of calcium sulphide, one grain to the ounce, would dissolve dry blood. We frequently make use of this solution to remove dry blood from our instruments. As the result of this observation, the question arose: If calcium sulphide will dissolve dry blood, will it prevent or dissolve abdominal adhesions? Another reason why it was used, was because of its magical action in completely removing the pathological conditions produced by bichloride of merury. These observations were made during Dr. J. H. Wilm's sublimate experiments. The question again rose if it removes or prevents pathological results produced by a chemical, will it remove or prevent pathology produced by bacteria?

In order to ascertain the value of calcium sulphide, in experimental peritonitis dogs were used; and while these experiments are not of any great importance, as to the value of calcium sulphide, they are valuable as controls to other experiments and do help to establish certain facts which are necessary in this chain of experiments. These experiments have been like problems of higher mathematics, since each step depends upon a previous step which has been taken.

The calcium sulphide experiments were performed upon *four dogs.* Their abdomens were not cleansed, neither were the instruments or sutures sterilized, nor the hands prepared in any way. Instead they were soiled before use. The intestines were removed from the abdomens and placed upon the dirty abdominal walls. The operations were.: One cholecystectomy with bile spilled within the abdomen and three containing abdominal sections. Before the abdomens were closed, they were filled with a warm aqueous solution of calcium sulphide, one grain to the ounce. The abdominal wounds were closed without drainage. Two out of four died, a mortality of 50%. Figures do not always disclose facts. In this series they do not tell the exact truth, since bile was spilled in the abdomen of the dog upon which cholecystectomy was performed, and since there was a raw surface upon the liver, which admitted infection directly into the blood stream. Again in one of the contaminating abdominal sections, the small intestines were deliberately lacerated for a distance of one inch and a soiled suture used to repair the laceration. These were the two animals which succumbed. Hence the mortality in this series was due to raw surfaces which admitted the infection directly into the blood stream.

The two dogs that died of peritonitis lived about twenty-four hours. Upon autopsy, the dog which had the intestines repaired with a soiled linen suture had an exudate of serosanguinous fluid, cholecystitis and acute nephritis; while the dog upon which cholecystectomy was performed, had a serosanguinous exudate, dilated capillaries upon the peritoneum, acute nephritis (old scars upon kidneys), lungs inflamed, right lower lobe consolidated.

On the twenty-first and twenty-third days after operation, the two dogs which survived, were killed. At autopsy, omental adhesions were present, which indicates that calcium sulphide did not prevent adhesions in these cases.

It was necessary to use controls to ascertain the value of calcium sulphide.

Four Controls, which had no preparation for operation, were used. Instruments, hands and sutures were not prepared; in fact sutures and hands were soiled before the operations. Three of the operations were simple, contaminating operations and one cholecystectomy. The dog upon which cholecystectomy was performed, had bile spilled within the abdomen, and was the only one which died in this series. Death was due, in this dog, to the raw surface upon the liver, which readily admitted infection into the blood stream. This gives a mortality of 25%, which means nothing.

Autopsies were held upon the dogs that recovered. These animals were killed seventeen days after operation and the only pathologic conditions found were omental adhesions.

The dog upon which cholecystectomy was performed lived 48 hours. Post-mortem examination revealed, erosion of the liver, which extended from the stump of the cystic duct along the gall-bladder fissure of the liver to the superior surface of the liver; serious exudate present; mesentery and intestines were bright red in color; lungs normal; fat embolism attached to cardiac valves; some fresh blood within fat clot.

Comparing the calcium sulphide series with the controls it will be observed that the two calcium sulphide dogs that died lived about twenty-four hours; while the control that died, lived for forty-eight hours. Death was due in the calcium sulphide series to raw surfaces; and death was due also in the controls that died, to a raw surface. These two series indicate that cholecystectomy plus the spilling of bile within the peritoneal cavity is fatal in the dog when proper treatment is not instituted.

The calcium sulphide experiments and the control experiments *indicate that the peritoneum protects the system against bacteremia.*

In all of the following experiments, the abdominal walls of the dogs were washed with the soap and water, shaved and again washed with an aqueous solution of lysol and finally painted with tr. iodine. The instruments, sutures, and hands were prepared as carefully as if an operation was to be performed upon a human being. These precautions were taken in order that bile would be the only infecting material, and that no bacteria, as far as could be prevented, might be introduced from without. These additional precautions afforded a milder test for ether and iodine.

The use of liquids within the peritoneal cavity of patients suffering with peritonitis was condemned years ago. To-day, however, 1% camphorated oil is advocated by A. Vignard and L. Arnand; 5% solthiosinamin by H. Tasano; ether by Morestin; iodine by Johnston and Crisler. There are also followers who use the solutions referred to. Ether and iodine are especially interesting at this time. Because of the present interest in the two latter solutions it was believed that a little research with ether and iodine would prove interesting.

Ether was used in the peritoneal cavity by M. M. Morestin in 1901. He used it as a prophylactic measure as follows: When during an operation for suppurative salpingitis, or when in an intestinal operation, the peritoneum was soiled, it was wiped with ether-soaked sponges, and ether poured into the abdominal cavity, and the abdomen closed without drainage. Morestin used *ether to disinfect the peritoneum.*

Temoin and Jeanneret support the claims made by Morestin.

In 1909 Herbert F. Waterhouse believed that he prevented infection of one of his fingers by the use of ether. Since that time he has used ether in peritonitis and abscesses. He washes out abscesses first with normal salt solution, after which ether is used and the wound closed without drainage.

In view of the fact that such favorable reports have been made by practicing surgeons, and because of the fact that laboratory reports have been unfavorable, as to the value of ether as an antiseptic within the peritoneal cavity, it is well to make a careful experimental study of the subject. *This research work has been undertaken to ascertain whether ether will kill bacteria, within the abdominal cavity, as its advocates claim, and also to learn whether or not it is advisable to close an abdomen without drainage, when large numbers of bacteria are left within the abdominal cavity after an operation.*

Ether was used in these experiments as a *prophylactic* remedy *and also as a remedy* in the treatment of peritonitis. Since the removal of the gallbladder and the spilling of the bile into the peritoneal cavity, had proven a fatal operation in the previous experiments, this procedure was decided upon as a good test for ether as well as for iodine. In all the other experiments the dogs were prepared as previously stated.

M. Tasano ascertained through experiments that six to eight hours were required for bacteria to develop within the abdominal cavity in peritonitis. Following the lead of M. Tasano, I used ether five to six hours after the infecting operation.

Ether was poured through a funnel which was introduced between the interrupted through and through sutures *five and six hours after the operations,* at which time peritonitis had developed.

The results were:—One dog lived thirty hours, another died of respiratory paralysis at the time of treatment and another lived ten days. Waterhouse had a patient who had respiratory paralysis due to ether treatment in peritonitis; fortunately, however, he saved his patient.

Autopsy of the dog which lived thirty hours: Stomach inflamed externally and internally, mesentery much inflamed. Small bowels inflamed outside in spots which were bright red. Colon also had these red spots. On the inner surface of the intestines there were slight ulcerations at the points where the red spots were. Adhesions, one small one between the raw surface of the liver and omentum, as well as another adhesion between omentum and cystic duct. Acute nephritis. Lungs normal. Heart contained fat clot in right ventricle and auricle. Some fresh blood present in this fat clot. Exudate serosanguinous and contained large numbers of bacteria mostly short chained streptococci and micrococci, one of the tetraginous type, 2 x 1, which had rounded ends with deep staining bodies, probably spores. The bile was saved at time of operation and contained the same kind of bacteria.

The dog that lived ten days had a pus discharging sinus, which entered the abdomen. Ether was introduced into this sinus two days before the dog's death. Autopsy: Abdomen full of pus. Adhesions between the omentum and raw surface of the liver as well as between the omentum and the stump of cystic duct. The omentum was also adherent to the duodenum and diaphragm. The pus contained large numbers of diplococci, a few of the tetraginous type.

Ether was used *as a prophylactic remedy in two dogs.* One of the dogs removed its stitches on the sixth day, was dipped on the ninth day and died three days later. This dog received not only the prophylactic treatment of ether, but also a subsequent treatment, as well as drainage. It is not included, as dipping may have caused its death. However, it was suffering from peritonitis. In the other dog the usual operative procedure obtained, ether was poured into the abdomen and allowed to evaporate before the wound was closed. A little portion of the *wound was left open for drainage.* The dog lived twenty-four hours. Autopsy: Stomach inflamed externally and internally while the intestines were inflamed in spots. Tubercles on the spleen and liver. Chronic nephritis. Lungs normal. Valves of heart thickened, one of which contained a small concretion.

Ether vapor was used as a prophylactic measure in one dog, which had its gall-bladder removed and bile smeared into the abdomen. It died of peritonitis within twenty-four houds. Autopsy: Stomach inflamed externally and internally. Fluid exudate within the abdomen. Adhesions of omentum to raw surface of liver and over stump of cystic duct. Acute nephritis. Lungs partially hepatized, and contained mucus. One heart valve thickened.

Ether has been found to be very irritating to the peritoneum by J. H. Wilms and by me. That ether will produce adhesions we have been convinced by previous experiments.

During my recent experiments with ether, one dog was used to ascertain the action of a small quantity of ether. This dog was anesthetized, his lower abdomen opened and two drachms of ether poured into the abdominal cavity and the incision closed. Nineteen days after the dog was killed. The intestines were found to be adherent to the urinary bladder. This experiment again confirms our belief that *ether will irritate the peritoneum and cause adhesions.* The abdomen in this case was not palpated and the incision was several inches above the urinary bladder.

S. Pope, of San Francisco, reported some experiments in the California State Journal in June, 1913. ("Experimental Data on Morestin Treatment of Peritonitis.") He laparotomized eight rabbits, brought their colons into the incision, removed contents and smeared them over the peritoneum. He then cleansed the peritoneum with ether-soaked sponges, and placed 1 dram of ether into the peritoneal cavity and closed their abdomens. All had vicious hemorrhagic peritonitis, with plastic deposits, agglutination of intestines, and purulent exudate. Six died of septic peritonitis. Two lived ten days in fair health, but had multiple adhesions. In two other rabbits, he introduced one dram of ether into the peritoneal cavities. Each developed purulent peritonitis. One of these died on the third day and staphylococcus aureus was found within its peritoneal cavity. He used two controls, soiled their peritoneums and cleansed them with normal salt solution. These two controls recovered.

W. C. Topley wrote a paper which was published in *The British Medical Journal,* February 6th, 1915. The title of this paper was "The Action of Ether on Certain Micro-organisms." This article appeared on the same date as the Waterhouse article and in the same journal. Topley placed bacteria and ether in the same tubes which were hermetically sealed and kept at body temperature. By this method the bacteria were continually immersed in an ether vapor bath. The following were his results:

Streptococci, pneumococci, B. pyocyaneus and B. Coli survived three hours, while many specimens of staphylococci survived five hours and some even twenty-four hours.

Topley used guinea-pigs also in his experiments and found that ether almost always markedly increased the severity of infection. In three instances he found B. Coli in the blood of the guinea-pigs' hearts upon autopsy.

On March 2d, 1914, Dr. Wilms and I injected 20 c.c. of ether into the peritoneal cavity of a dog at 4:20 P.M., at 4:30 P.M. ether was detected in the breath. At 4:31 P.M. 18 c.c. of ether again injected into the peritoneal cavity of the dog. At 4.51 P.M., which was thirty-one minutes after the first injection and twenty minutes after the second injection, the abdomen was opened and no ether found.

If it requires from three to five hours and more to kill bacteria in vitro; how can we expect ether when introduced into the abdominal cavity of an animal, whether quadruped or biped, to kill bacteria when it is absorbed in thirty minutes?

A cholecystectomy control without drainage. One dog was used. Gall-bladder removed, bile spilled into the peritoneal cavity. This dog was suffering with cholecystitis at the time of the operation; its bile was thick and contained streptococci, staphylococci and colon bacillus. The bile was wiped out with gauze sponges which were saturated with sterile water, after which the abdomen was closed. The dog was in fair shape four days before he was killed. He was killed seven days after the operation because of distemper. Autopsy disclosed a serosanguinous exudate. Omental adhesions to raw surface of liver and to the stump of cystic duct. Liver adherent to diaphragm.

Drainage Controls. Drainage has long been accepted as a rational surgical procedure in the presence of abdominal infection.

Three dogs were used in this series—they were prepared and operated upon in the same way as those treated with ether. Drainage was produced by inserting a linen suture on each side of the superior portion of the abdominal wound. This held the wound open and afforded good drainage.

Two of the dogs had their abdomens mopped out with gauze moistened with normal salt solution; while the other dog had its abdomen mopped out with gauze which had been soaked with sterile water. The two dogs which were mopped out with gauze moistened with normal salt solution, were used for other experiments 21 and 24 days after the first operation. At the time of the second operation, the omentums were found to be attached to the raw surfaces of the livers and to the stumps of the cystic ducts. In one dog the omentum was attached to the stomach. All the rest of their abdominal cavities were normal.

Thirty days after the primary operation upon the dog which had its abdomen mopped out with gauze soaked with sterile water, another abdominal operation was performed. At this second operation, the omentum was found adherent to the raw surface of the liver and to the stump of the cystic duct. The stomach was greatly distended. This was due to adhesions between the liver and duodenum, and especially was it due to a thick band which ran in a longitudinal direction on the inferior surface of the duodenum. This band caused a kink of the duodenum and this kink caused both obstruction of the duodenum and hypertrophy of the pyloric sphincter muscle. This dog *recovered in spite of the great violence of its infection.* Its bile at operation, contained few streptococci, many staphylococci and diplococci.

Since bile was spilled in the three drainage controls and since they recovered, and since the other ether experiments were fatal; it seemed *unnecessary to use more drainage material.* These drainage cases indicate that it is *not antiseptics* that are required within the peritoneal cavity, *but drainage.*

Iodine, no doubt, is a good antiseptic. It is probably the best antiseptic in general use to-day. I use it in my surgical practice. All our dogs at the laboratory, when good results are desired, are painted with tr. iodine, before operation.

The peritoneum is a very delicate structure. Therefore, there is a reason to doubt the beneficial results obtained from strong solutions of iodine in general peritonitis.

Iodine treatment was first used experimentally by E. E. Johnson of Memphis. He later became associated with Joseph A. Crisler, also of Memphis; and since that time they have been using iodine in peritonitis.

F. T. Fort, of Louisville, has written favorable reports of the iodine treatment of peritonitis.

On account of the difficulty of obtaining material, only a few dogs were used in this series of experiments.

The first dog experimented upon was prepared for operation in the same careful manner as previously described. After cholecystectomy the bile was poured into the peritoneal cavity. This bile contained streptococci and thick bacilli with rounded ends, these bacilli were probably spores. Tr. iodine and alcohol, equal parts, were poured into the abdominal cavity. This solution is the one recommended by Fort and is claimed by him to be the Johnson and Crisler solution. One-half ounce of this solution was introduced within the abdomen four hours and twelve minutes after section. This dog was very seriously ill with peritonitis at the time of treatment. It *lived less than twenty-four hours.*

Autopsy revealed an infected wound. The solution of iodine had caused an enormous irritation of the abdominal wound, which extended for more than six inches from the incision, in every direction. There was a serosanguinous exudate within the abdominal cavity. Omentum adherent to raw surface of liver and stump of cystic duct. Iodine was precipitated upon the stomach. Stomach and intestines inflamed. Pneumonia present. Heart contained a small fat tag attached to one of the valves.

Iodine Inoculation Experiment. Inoculated dog with pus, which was obtained from the peritoneal cavity of a dog that had died of peritonitis. A syringe was used to inject the pus into the abdominal cavity; at 11:55 A.M. A warm aqueous solution of iodine, which contained one part tr. iodine to ten parts of sterile water was poured into the abdominal cavity, after the abdomen was opened at 12:43 P.M. There was a dullness over left lung at the time the solution of iodine was introduced into the abdomen. *This dog was more seriously ill when it received the iodine treatment than the previous dog, which was treated with iodine.* This dog, which was inoculated, *lived more than twenty-four hours.*

Autopsy: Stomach inflamed externally and internally. Small intestines inflamed externally and internally. This intense inflammation of the small intestines corresponded to the point of inoculation. Mesentery also very much inflamed. The bicornate uterus inflamed. Small amount of exudate which contained many short-chained streptococci and a few short thick bacilli, 2 x 1. The pus with which the dog was inoculated contained large numbers of pus cells, short-chained streptococci and the small bacilli with rounded ends, 2 x 1.

Adhesions due to iodine: On February 27th, 1914, a little white bitch was opened, and the peritoneum and omentum were painted with tr. iodine. Nine days after the dog tore out the stitches. She was anesthetized and the abdomen explored. Multiple and dense adhesions were found.

On October 19, 1916, another dog was prepared surgically for abdominal section. The preparation was the same as previously described. The abdomen was opened and a warm aqueous solution which contained tr. iodine ʒ ss, sterile water ʒ v, was poured into the abdomen. November 2, 1916, the dog was again anesthetized and the abdomen opened. The only adhesions found were adhesions between the omentum and the peritoneum below the old incision.

Operation.	Drug used.	Time drug used.	No. hrs. Dog lived.	Recovered.	Bacteria found.
No. 1. Cholecystectomy bile spilled.	Calcium sulphide; 1 dog.	At time of operation.	No preparation; 24 hours.		
No. 2. Cholecystectomy bile spilled.	Ether vapor.	At time of operation.	24 hours.		
No. 3. Cholecystectomy bile spilled.	Ether evaporated before closing wound.	At time of operation.	Less than 24 hours.		
No. 4. Cholecystectomy bile spilled.	Ether.	6 hrs. after and 9 days; nature drain.	264 hours.		Pus cells diplococci thick bacilli (: :) 2x1.
No. 5. Cholecystectomy bile spilled.	Ether.	5 hrs. 40 min. after.	Ether respiratory; paralysis at time of treatment.		
No. 6. Cholecystectomy bile spilled.	Ether.	5 hrs. 50 min. after.	30 hours.		Numerous streptococci; micrococci tetragenous.
No. 7. Cholecystectomy bile spilled.	Tr. iodine alcohol *a a.*	5 hrs. 3 min. after.	Less than 24 hours.		Streptococci.
No. 8. Infected with pus injected into abdominal cavity.	Tr. iodine. 1 to 10 of water. Dog more serious than one above.	12 hrs. 48 min. after.	Over 24 hours.		Many short-chained streptococci; short thick bacilli 2x1.
No. 9. Cholecystectomy bile spilled; 1 dog.	No drug; no drainage.		No preparation; over 48 hours.		
No. 10. Cholecystectomy bile spilled; 1 dog.	Sterile water to mop out; *no drainage.*	At time of operation.		Killed on 7th day.	Bill before operation: *Streptococci, Staphylococci B. Coli.* Post morteim: Serosanguinous exudate; not examined.
No. 11. Cholecystectomy bile spilled; 2 dogs.	Mopped out with normal salt. DRAINAGE.	At time of operation.		Two recovered.	
No. 12. Cholecystectomy bile spilled: 1 dog.	Mopped out with sterile sterile water. DRAINAGE.	At time of operation.		One recovered.	

The first experiment proved conclusively that tr. iodine will cause adhesions, when used undiluted.

In the second experiment there is room for doubt, since the omental adhesion might have been due to the operation.

The following observations are made from the accompanying table:

The calcium sulphide dog survived 24 hours. Only two of the five dogs, in which ether was used, lived over 24 hours. These two dogs survived 30 and 264 hours, when they died of peritonitis. Of the three remaining dogs, one died of respiratory paralysis during treatment; one lived less than 24 hours; and one lived 24 hours. The dog that lived 264 hours had an abdomen full of pus; the dog that survived 30 hours had streptococci and micrococci in its exudate.

In the iodine experiments it is seen, that the stronger iodine solution was used in the dog which survived less than 24 hours; while the dog treated with the weaker solution lived over 24 hours. They each died of peritonitis. Streptococci were found in the exudate of each.

Dogs No. 9 and No. 10 in the table were not drained. No. 9 received no treatment and survived 48 hours. No. 10 was infected with bile which contained streptococci, staphylococi and colon bacillis; it was killed on the seventh day when it was found to have peritonitis. *The three drainage cases survived and speak for themselves.*

From the experiments enumerated in this paper, it seems that the last word has not been spoken about the ether or the iodine treatment of peritonitis. It also seems that these treatments may not yet be accepted, and that they are on trial. It is to be hoped that others will make experimental and clinical observations and that the true merit of these treatments may be obtained in the future.

The following conclusions have been based upon the experiments considered in this paper:

1. That calcium sulphide has no value as an antiseptic and did not prevent adhesions in these experiments.
2. That ether has no value as an antiseptic in the prevention or treatment of local or general peritonitis.
3. That ether will cause respiratory paralysis, when used in large quantities within the abdomen.
4. That ether is irritating and will cause adhesions when used upon the normal peritoneum.

5. That ether aids rather than inhibits infection in the peritoneal cavity.
6. That tincture of iodine and alcohol, equal parts, proved to be extremely irritating and harmful.
7. That tincture of iodine will cause adhesions when applied to the peritoneum.
8. That tincture of iodine and water did not prevent peritonitis.
9. *That drainage* is preferable to calcium sulphide, ether or iodine in the treatment of peritonitis.
10. That the peritoneum protects the system against bacteria.

Thanks are extended to Dr. R. E. Amos for his kindness in making the microscopic examinations in these experiments.

REFERENCES.

1. F. T. Fort: Peritonitis: With Especial Reference to the Use of Iodine in Its Treatment, June 1, 1915, Vol. XIII.
2. L. Jeanneret: De L'emploi de l'ether dans les infections peritoneales. Rev. Med. d la Guisse, Rome, Geneve, 1913, XXXIII, pp. 909-913.
3. S. Pope: Some Experimental Data on Morestin Treatment of Peritonitis, California State Journal of Med., June, 1913, No. 6, pp. 211-250.
4. W. W. C. Topley: The Action of Ether on Certain Micro-Organisms. British Med. Jour., Feb. 6th, 1915.
5. M. Tasano: Treatment of Diffuse Purulent Peritonitis. Policlinico, Rome. May 12.12. XIX, p. 709.
6. A Vignord and L. Arnand: L'injection intraperitoneale d'huile camphoral dans le traitment des peritonitis diffuses aignes. Revue de Chirurgie, Paris. May, 1912. XXXII, No. P, pp. 585-864.
7. Herbert F. Waterhouse; British Med. Jour., Feb. 6-15, pp. 233-37. A Report on the Employment of Ether in Surgical Therapeusis, With Special Reference to Its Use in Septic Peritonitis, Pyogenic Arthritis and Gun-Shot Wounds.

CHOLECYSTECTOMY: WITH A REPORT OF SIXTY-FIVE CASES OPERATED ON FOR GALL-BLADDER DISEASE.*

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The gall-bladder is found in reptiles and most fishes, but not in all vertebrates; the ass, horse, elephant, deer and rhinoceros have none. To find it absent in man is a very rare condition. In those animals that have no gall-bladder there is found a large common duct which runs direct from the liver to the duodenum. Judd and Mann have found a condition similar to this in their experiments on animals. They found that the ducts usually became dilated within 60 days after removal of the gall-bladder. All of the ducts were dilated except those within the liver itself. For a time the intradochal pressure was considerably increased—due to a muscle at the duodenal end of the duct which was described by Oddi as being a sphincter of plain muscle entirely independent of the muscular coat of the intestine. Judd has found that this muscle is gradually overcome as the ducts dilate and the pressure becomes very great—the bile then flows continuously into the duodenum and is not forced back into the pancreatic ducts. When Oddi's muscle was dissected out at the time of the removal of the gall-bladder no dilatation of the ducts followed unless obstructed by adhesions.

FUNCTION.

Meltzer states that the law of contrary innervation is manifest in all functions of the animal body and he believes that a disturbance of this law is a factor of more or less importance in the pathogenesis of many disorders and diseases of the animal body.

He considers the muscle fibers of the gall-bladder and those of the papilla as antagonistic. During the storage of bile the muscle fibers in the papilla are contracted and those of the gall-bladder are inhibited; during the discharge the gall-bladder contracts and Oddi's muscle is relaxed; the bile has nowhere to go but into the duodenum. Stimulation of the peripheral end of the splanchnic nerves causes simultaneously a contraction of the gall-bladder and inhibition of Oddi's muscle.

The vagus seems to contain motor fibers for the sphincter of the common duct and inhibitory nerve fibers for the gall bladder.

The discharge of bile can be greatly curtailed by the absence of a reduction of the discharge of chyme from the stomach into the duodenum. The infrequent taking of food, say one or two meals a day, may lead to pathologic consequences. Meltzer thinks that even in health it is advisable to take of comparatively frequent meals, which need not consist of large quantities.

That the gall-bladder is used as a reservoir is being questioned by many—as normally from 30 to 50 ounces of bile is secreted in 24 hours and the gall-bladder can hold at most only a few ounces. The most common theory is that the gall-bladder contracts rhythmically 8 to 10 times per minute and overcoming the sphincter of Oddi forces the bile into the duodenum. Some physiologists claim that the bile is secreted in the intervals between digestion and collects in the gall-bladder and becomes condensed by the absorption of water. Flexner has proven that the bile mixed with the mucus from the gall-bladder is much less irritating to the pancreas.

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* Read before The Chattahoochee Medical & Surgical Association at Warm Springs, Ga., July 11, 1917.

Pancreatitis.—Several years ago I had the pleasure while in London of seeing a number of very complicated gall-bladder cases diagnosed and operated on by Mayo-Robson; he laid great stress on always preserving the gall-bladder when there was any disease of the pancreas. And it was not until the work of Rosenow showed us that the infection was in the tissues of the gall-bladder and not in the bile that gave the most trouble was I convinced that we were draining gall-bladders that should be removed. Rosenow has shown that the infection is brought to the gall-bladder through the blood stream and the bacteria become lodged in the capillaries of the wall of gall-bladder and the infarcts cause stasis,. infiltration thickening of the mucous membrane with necrosis. He has shown that cultures can sometimes be made from the bile in the acute and subacute gall-bladder infections, but a bacterial culture can be constantly gotten from the deeper tissues. When these bacteria are injected into the circulation of animals similar acute gall-bladder infections are produced in 80 per cent of the animals.

Judd thinks that the continuous flow of bile into the duodenum, which prevents any backflow into the ducts of the pancreas, is probably responsible for the cure of the pancreatitis after cholecystectomy.

It may be possible that removal of the gall-bladder, with the infection buried in the tissues of the gall-bladder, takes away the source of infection and allows the pancreas to recover.

Gall stone formation.—Gall stones are rarely ever found in the very acute and severe infections of the gall-bladder, but are the result of a previous mild infection of the gall-bladder. Seventy-five per cent of gall stones are found in women and in 80 per cent of these patients the symptoms develop during pregnancy.

In about 25 per cent of diseased gall-bladders no stones are found.

Bevan (Chicago) says cholecystectomy is done in about 90 per cent of cases, cholecystotomy being reserved for simple cases with little gall-bladder change and no cystic duct stones. When stones are found in the cystic duct the gall-bladder should be removed.

F. B. Lund (Boston) was one of the earliest advocates of removal of the diseased gall-badder—he advocates removing the acutely inflamed and especially the gangrenous gall-bladders and those where we have an acute perforation.

R. S. Fowler (Brooklyn) thinks that it is logical to assume that cholecystectomy is indicated in all diseases of the gall-bladder, whether causing mild or severe symptoms. Just as soon as the efficiency of the gall-bladder is impaired it should be removed.

METHOD OF OPERATING.

At the Mayo Clinic the cystic duct is caught in a pair of forceps and severed and the duct below and the cystic artery are doubly tied and the gall-bladder is dissected from below up, using the gall-bladder as a tractor.

Major Seelig in an excellently illustrated article in the *Surgery Gynecology and Obstetrics*, July, 1917, advocates the removal of the gall-bladder beginning at the fundus and dissecting downward and after tying the cystic artery he clamps the cystic duct and severs it below the clamp so that the duct can be probed in every direction to make sure there are no stones.

I believe the occasional operator should begin his dissection at the fundus and work down carefully, so that he has the cystic duct clearly in view when he ties it off. To prevent making too much traction on the ducts a clamp may be applied, as suggested by Judd, to the suspensory or round ligament of the liver and the liver can be pulled upward in this way, severing the ligament if necessary.

RESULTS.

Judd reports 10 cases on whom cholecystectomies had been done more than 15 years, nine patients living, one had good health for two years and died as a result of an accident. Seven of the remaining cases had a typical history of gall stones and six of these enjoy perfect health. The other two cases complained chiefly of "stomach trouble," one had stones in the common duct and the other in the cystic duct; both claim very little relief from their symptoms, but both are able to do their own household work.

I have operated upon 65 cases for diseased conditions of the gall-bladder. In 20 cases the gall-bladder was removed; 15 of these cases were operated during the past year. In one case the gall-bladder was anastomosed to the duodenum for a persistent fistula following drainage done two years before in an adjoining city. Seven cases had been drained previously. There were 17 males and 48 females.

The Woodward.

REFERENCES

Chas. H. Mayo: Surg. Gyn. & Obs., Mar., 1917, p. 281.
E. S. Judd: Ill. Med. Jour., Mar., 1917.
E. S. Judd & F. C. Mann: Surg. Gyn. & Obs., Apr., 1917, p. 437.
R. Oddi: Quoted by Judd.
Major G. Seelig: Surg. Gyn. & Obs., July, 1917, p. 45.
A. D. Bevan: Surg. Clinics of Chicago, 1917, Vol. 1.
S. J. Meltzer: Amer. Jour. Med. Scien., Apr., 1917, p. 469.
R. S. Fowler: Amer. Jour. Med. Scien., Apr., 1917.
F. B. Lund: Surg. Gyn. & Obs., Mar., 1917, p. 275.

REPORT OF FOUR CASES OF CARCINOMA OF THE BLADDER LOCALLY REMOVED BY RADIUM*

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In bladder tumors the burden of proof of malignancy rests somewhat lightly upon the microscopical examination, and pretty heavily upon the clinical findings which make for malignancy. As far as the microscopical examination alone goes the squamous-celled carcinomata are more malignant, and infiltrate the bladder wall more rapidly than the commoner papillary carcinomata. Some varieties of these latter show more malignancy and more rapid growth and infiltration than others. The clinical conditions which make for malignancy are, in order of their importance:

1. Induration revealed by touch (rectal or vaginal) or by cystoscopy. When a tumor feels hard one is much more certain of one's findings than when one sees (or thinks one sees), by means of the cystoscope, an induration of the base of the tumor. In the latter case the personal equation enters much more than in the former.

2. Slough. Only malignant tumors slough. Such slough appears as grayish or whitish areas in the tumor mass. Here again one may err, and I have often been surprised how one's idea of a bladder tumor changes with subsequent cystoscopies. In difficult cases a number of cystoscopies may be necessary to accurately determine both the extent and the appearance of the tumor.

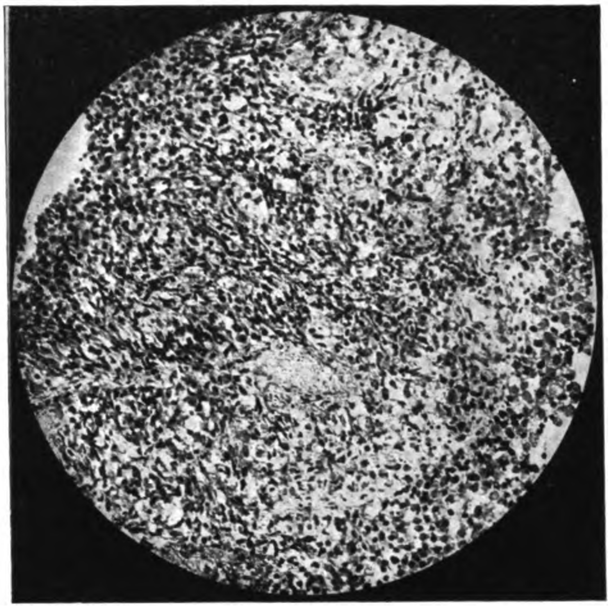
3. Reaction to fulguration. Keyes and Geraghty have called attention to this feature. Benign tumors are quickly burned off by fulguration. Malignant tumors react stubbornly or not at all.

4. Age. The older the patient the more likelihood of carcinoma.

5. Multiplicity and size of tumors. Multiple tumors speak for malignancy. Nevertheless the so-called benign papillomata are much more apt to be multiple than carcinomata. The large size of a tumor rather speaks for difficulties in its removal than for malignancy.

EFFECT OF RADIUM ON BLADDER TUMORS.

In a large majority of the cases in which I have applied radium to bladder tumors, the hematuria has stopped two or three days after the irradiation. There is a suggestion in this that the primary effect of the radium is upon the bloodvessels. If this is so it would in a measure explain why papillomata of the bladder, rich in bloodvessels, react somewhat more slowly to radium than true carcinomata which have poor and imperfectly developed bloodvessels.



Case I. Microphotograph of specimen removed from tumor.

In some cases the rapidity of the action of radium is astonishing. Case I, was irradiated January 19th, and on February 4th (sixteen days later) cystoscopy showed that an extensive carcinoma had entirely disappeared.

Radium burns of normal portions of the bladder have occurred only in those cases in which carcinoma was around the bladder neck, and in which the radium was pulled into the urethra and kept there for a long time. I have had two such cases. The burns last a long time, and cause considerable irritation. Division of the radium dose into two or more tubes; using somewhat smaller quantities; change in the position of the patient during application; and a fairly long interval between irradiations —six weeks or more—ought to prevent such burns.

The four cases here reported are picked from some twenty-five cases of carcinoma of the bladder which have been, or are being, treated by radium. They are interesting because they probably all fall into that class of bladder carcinomata which is most malignant.

Case I. Signs of malignancy—Large tumor, vaginal induration not determined; sloughy in part; microscopical diagnosis of carcinoma; fulgurated twice, with no improvement; age 69.

C. A. G. Her chief complaint was urinary frequency for the past year. At night 3 to 4 times, in the day every 3 to 4 hours, and pain following urination. She had been passing bloody urine for the past four months. A number of months before I saw her she was cystoscoped, and a diagnosis made of inoperable carcinoma. Cystoscopy showed large red carcinoma with necrotic patches on the left side of her bladder obscuring her left ureteral orifice. The tumor was probably as large as a fifty-cent piece. Specimen removed showed the following (Dr. Ewing):

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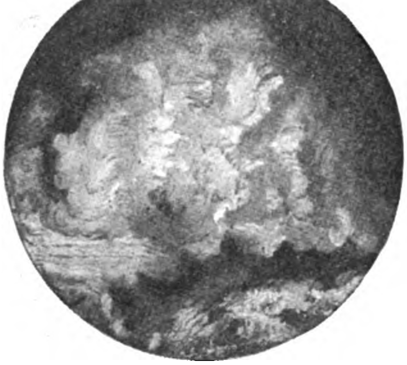
*Read before the New York Branch of the American Urological Association, February 7, 1917.

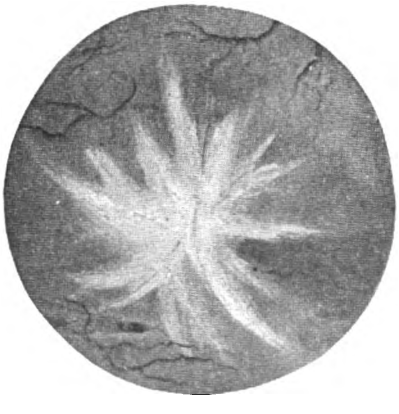
"The section is of a small mass of tumor tissue 2 mm. in diameter. It shows the structure of a small alveolar carcinoma, much inflamed, with dilated blood vessels. The cells are clear, irregular in size, with large hyperchromatic nuclei, and arranged in small groups. The stroma is scanty."



Case I. Carcinoma of bladder before radium application.

January 19, 1916, 100 m. c. of screened radium in her bladder for eight hours.

February 4th, she reported that she had some frequency and severe bladder pain for two days; then everything normal. Cystoscopy (with Drs. Keyes and Jeck) showed that the tumor was gone, the area covered with normal mucous membrane, and the ureter visible.



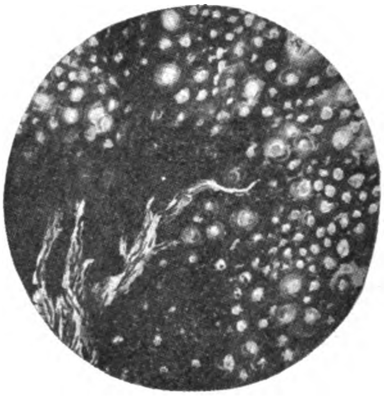
Case I. Ten and a half months after disappearance of tumor.

July 6th, she had gained 4 or 5 pounds in weight, had a slight cystitis due to a cystocele, but there was no tumor.

December 19th, she had a stellate, white scar in the place formerly occupied by tumor. No tumor visible. Reduplication of uterus.

Case II. Signs of malignancy—Tumor as large as a ten-cent piece; no induration; ulcerated; microscopical diagnosis of carcinoma; fulgurated four times in six months and recurred; age 59.

C. T. Eight months before seen the patient had occasional attacks of painless hematuria. He was cystoscoped and a papilloma near the left ureter was seen. This was burned with high frequency four times in about six months, but had always recurred. Dr. Keyes saw it in January, 1916, when it was an ulcerated area with carcinomatous looking lumps. A piece removed showed diffuse carcinoma (Dr. Ewing):



Case III. Appearance of bladder tumor before radium application.

"The section is from a mass of tumor tissue 5 mm. in diameter. It presents a small alveolar and diffuse carcinomatous structure. The cells are extremely atypical, and some are of very large size, with very hyperchromatic nuclei. The outer portions are hydropic, the central areas show fibrosis, and here the tumor cells run in narrow rows or small groups."

February 11, 1916, 214 m. c. of screened radium for seven hours.

May 2nd, cystoscopy showed normal mucous membrane over the space occupied by the carcinoma. He had 7 or 8 erections following treatment, while he had been practically impotent for 10 years before.

July, he had gained 10 pounds. Cystoscopy (by Dr. Ballenger) negative.

On November 8th, Dr. Ballenger reported "has passed no more blood. Cystoscopy about a month ago showed only a reddened place where the growth was. There has been a rather persistent cystitis."

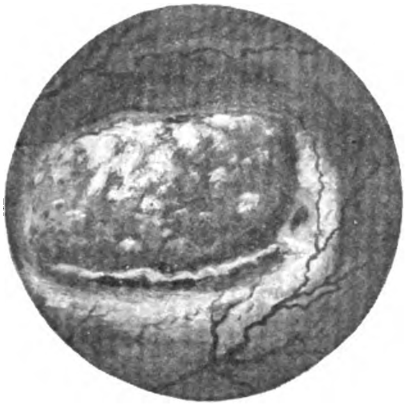
Case III. Signs of malignancy—Extensive tumor; vaginal induration as large as a silver dollar; sloughy in part; microscopical diagnosis of papillomata; no fulguration; age 54.

Mrs. E. J. Chief complaint hematuria for the past year, and urinary frequency at night 5 to 20 times. Cystoscopy showed grape-like, red, partly sloughy tumor around the bladder neck. Vaginally there was an indurated area of the base of the bladder nearly as large as a silver dollar. Examination with Drs. Brown and Fish of Memorial Hospital.

Specimen removed was reported papilloma (Dr. Ewing). Because of the induration, and because of the slough, I considered this carcinoma.

July 6, 116 m. c. of radium in bladder neck for 6 hours. Reported one month later that she had a little discomfort in passing urine for a few days. She had gained 15 pounds in weight, got up but twice at night to urinate.

August 29, she still had tumor around bladder neck; 100 m. c. of radium in bladder neck for 8 hours. She had no hematuria following the first radium.



Case IV. Indurated Carcinoma of bladder before radium application.

October 30, 1916, reports she had no pain after the radium. Cystoscopy showed the tumor to be gone. She had gained 18 pounds. No induration of bladder base. Had no night urinary frequency.

Case IV. Signs of malignancy—Tumor as large as a quarter; induration shown by cystoscopy; sloughy; microscopical diagnosis of carcinoma; fulgurated twice, and tumor grown 2 or 3 times its original size; age 62.

J, A. H. History of two attacks of total hematuria, one month and eight days before seen. No night frequency; no loss of weight. Dr. Keyes saw the cystoscopy a red, lobulated, rather flat carcinoma close to right ureter, burned it with high frequency and advised radium. The patient went to another physician who fulgurated the tumor and decided against both operation and radium. About three months later he returned when (with Dr. Keyes) a flat, in part sloughy, carcinoma was seen, two or three times the original size, extending from the bladder neck to a point 2 cm. above right ureter. It had raised, thick, indurated edges. A specimen removed showed (Dr. Ewing) carcinoma. Two tubes of screened radium (one 90 and one 89 m. c.) were left in his bladder 6 hours.

Two months later he returned when there was seen redness of right side of his bladder, a small ulcer back of ureter (well away from where the tumor was) probably due to radium burn. *No other lesion was seen.*

109 East 34th Street.

Cystoscopic Retrovesical Transillumination.

If we insert the cystoscope into the bladder, dilate the viscus with water, introduce an electric bulb into the rectum, and turn out the cystoscopic light, we find it possible to transilluminate the intervening structures. So thoroughly can this be done that the tiny blood vessels at the base of the bladder are distinctly seen, and changes in tissue thickness and density can be accurately determined, and the ureter followed for a little distance. While I have not had the opportunity to study such a case since first using the method, I feel perfectly sure that stones in the lower end of the ureter could be distinctly seen.

Owing to the small field of distinct vision offered by the cystoscope, and the close proximity of the rectal light, a large surface cannot be observed at one time, but by moving the rectal light in various directions and following the illuminated portion with the cystoscope, the size and mobility of the rectum permit of a study of the entire base of the bladder and well up on the posterior wall.

In the normal bladder, the light becomes visible in the median line about 1.5 cm. behind the so-called urethral uvula, and can be seen as it passes up along the posterior bladder wall. When moved laterally, it becomes dim and disappears behind the ampulla and seminal vesicle; if held directly under the ureteral orifice, the distinct widening of an ellipse of intense light can be seen during the expulsion of urine, the surrounding muscle fibres and ureteral wall showing much greater light obstruction.

For the purpose I have had made a curved shaft for carrying a large transillumination lamp. This curve was found necessary because the straight shaft not only restricted lateral motion but pushed too sharply into the base of the bladder. The lamp gives a very brilliant light, and, being surrounded by an air chamber, there is no danger of producing a burn. . . .

Obviously the real value of this procedure is in the determination of infiltrations of tissue from vesical, prostatic or rectal growths, and the diagnosis of stones in the lower end of the ureter. Whether it will be of much value in conditions involving the seminal vesicles is a question, as these organs vary so much in shape and size that we hesitate to diagnose inflammatory changes here from shadows alone.—P. S. Pelouze in *The N. Y. Medical Journal.*

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, DECEMBER, 1917.

WAR SURGERY.

A consideration of the surgical literature of the past two years or more would indicate that surgical thought is chiefly concentrated today on war injuries, and that in other fields surgical progress has slackened its pace. The total has been, however, a decided quickening of investigation, a reexamination of old problems, a revamping of more or less accepted doctrines, a readjustment or definite alteration of previously established methods, and a concentrated study of plastic restitution of deformities, and of injuries and infections of the skeletal tissues and the nervous system.

When the war is over surgeons now at the front will take back to civil practice throughout three continents these new experiences, these new viewpoints. Their work has been in the surgery of injuries and of the serious infections that result therefrom. Injuries and infections constitute a large part of the practice of surgery at all times, and so we may expect to see—indeed, we have already seen—a reflection of the experiences of war surgery in civil practice.

Considering the "Surgical Lessons of the War" in the November issue of THE JOURNAL, we pointed out that although no epochal surgical discovery has thus far come out of it, several important changes have come about in the management of injuries to the bones and joints and, especially, in the treatment of wound infections. Concerning the former and concerning also injuries to the brain, the spine, the thorax and the abdomen, modifications and improvements have been in details rather than in principles. In the treatment of wound infections methods have made a wider departure from those formerly accepted in civil employment. While here, too, we would repeat, practice rather than principle has altered, the change, both in viewpoint and in procedure, has been a decided one.

The thoughtful civilian practitioner finds much in current military surgical literature that is, and more and more will become, significant in his own work. Those who expect never to be nearer to war work than they now are will nonetheless do well to read these articles as they appear and, especially, those with which the *British Medical Journal* and *The Lancet* are replete. Later we may expect our own medical journals to contain an increasingly large percentage of surgical and medical articles from the front.—W. M. B.

THE CARREL-DAKIN SOLUTION.

We have received several inquiries concerning the manufacture of Dakin's solution from chlorine gas and sodium bicarbonate which we referred to editorially in the November issue of THE JOURNAL as a great improvement on the original method of manufacture from bleaching powder ("chloride of lime").

We had in mind the apparatus made by Wallace and Tiernan, 137 Centre Street, New York (which costs $70, including one 12-pound cylinder of chlorine), and that made by the Electro-Bleaching Gas Company, 18 East Forty-first Street, New York. Both have been employed with satisfaction by Carrel at the Rockefeller Institute War Demonstration Hospital. Made with chlorine gas, using either of these apparatus and disregarding the initial outlay, the Dakin solution will cost less than two cents a liter. For ease of manufacture and low cost this method is excellent for large hospitals. For use on a small scale, as in the patient's home, the sanitarium or the office, the best method of making the Dakin's solution, as far as we know, is with ampoules of liquid chlorine and of soda (Johnson and Johnson method). Thus made, the solution will cost about 30 cents a liter, but it can be made "on the spot" and very quickly and without any special apparatus, and it involves no initial expense.

Chloramine-T (para-toluene-sodium-sulphochloramide), also developed by Dakin and known in this country under the trade name of "chlorazene," is, like the sodium hypochlorite solution, noninjurious to the tissue. It is rather less strongly antiseptic and somewhat less powerful in breaking up blood clots than "Dakin's Solution" and is not to be preferred, therefore, for deep wounds and serious infections. It is excellent for less severe infections and for superficial wounds and may thus be employed in paste or in solution made from powder or tablets. These are manufactured by The Abbott Laboratories.—W. M. B.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

The Sterilization of Criminals.

The problem of the sterilization of criminals is still far from solution. The questions of heredity, surgery, of law, morals, religion, and sociology surround the subject with a diversity of opinion that thus far has made a single point of view practically impossible. The American Institute of Criminal Law and Criminology has had a committee considering the question and its recent report in the *Journal of the American Institute of Criminal Law and Criminology,* November, 1917, indicates the impossibility of uniting upon a definite policy based upon known facts.

The purpose of sterilization, whether vasectomy or castration, is to protect the race from the propagation of the criminal type. Obviously this aim is dependent upon a belief in the heredity of criminal characteristics. Thus far evidence is lacking to prove beyond a doubt that criminality is an inherited trait, wherefore sterilization fails as a guaranteed method of eliminating criminals in the general population, though it naturally reduces the birth rate through the medium of sterilized criminals.

To regard vasectomy as a punishment requires a stretch of the imagination in view of the fact that sexual feeling is not destroyed nor is virility deadened. From the standpoint of society the vasectomized individual continues to be a menace to the population in so far as the dissemination of venereal diseases is concerned. The responsibility for parenthood is destroyed, but the possibility of infecting others and lessening their value as progenitors is in no way lessened. To this extent, therefore, the operation of vasectomy may actually react unfavorably upon the race and indirectly lead to the development of defectives whose tendency to criminal careers is well known.

The few State laws now in existence approving of sterilization are more prominent in their breach than in their observance, and as a result they have failed to supply any adequate data as to the value of the sterilization of criminals, either as a sanitary measure or as a proceedure promoting racial betterment.

If criminality is dependent upon heredity there must be some unit traits which are inheritable. Feeblemindedness, lack of sex control, wanderlust, may possibly be regarded as inherited traits, but even these elements do not serve to involve criminality as a natural consequence.

If the environment is the essential factor in bringing about the manifestation of criminal tendencies it is patent that sterilization can not serve as a remedy. The conflict between eugenic and euthenic theories is striking and must be satisfactorily adjusted in order to secure a scientific basis for sterilization.

Religious question or considerations of the constitutionality of laws or protests against unusual cruelty in punishment are virtually subordinate to the primary question, why should the criminal be sterilized?

The surgical phases of the problem are trifling in character save insofar as there is involved the right of the State to cause mutilations because of crimes against the State. Inasmuch as the death penalty is exacted in most States of the Union there can be little reason to believe that the State is without power to exact a lesser penalty. If an operation, however, should be followed by infection and death there might be a serious entanglement involving the right of a State to compel a criminal to undergo surgical operations in the absence of scientific conclusions demonstrating that the attempt at such surgical procedures are distinctly in the interest of the health and welfare of the State.

In the light of the difficulties of arriving at an agreement as to the racial advantages of sterilization it would appear to be of primary importance to secure a more thorough investigation of the subject in every way possible. Sterilization is not to be regarded as punitive in character, but as racially protective. If scientific grounds are not available for demonstrating the eugenic value of the practice, there should be a temporary halt in the efforts to secure legislation authorizing its performance. Curative surgery and preventive surgery play important parts in social progress, but whether the sterilization of criminals comes under either of these heads remains to be proven.

Mortality Statistics.

The Metropolitan Life Insurance Company invites physicians, public health and social workers to make use of its valuable collection of mortality statistics.

These statistics present the principal causes of death among white and colored wage-earners in the United States and Canada. The material covers over ten million individuals for each of the six years, 1911 to 1916. Death rates are available for each race, by sex and by age period.

The company hopes in this way to aid in the study of disease and disability among wage-earners. It desires to stimulate medical investigation and research. By offering these statistics to the medical profession and to public health and social workers the company expresses also its appreciation of the cooperation which it has received from physicians and others who have replied to inquiries and have given detailed information in thousands of cases. This assistance has helped to make the statistics more accurate and valuable.

All inquiries should be addressed to Statistical Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York City.

Book Reviews

White and Martin's Genito-Urinary Surgery and Venereal Diseases. Edward Martin, A. M., M. D., F. A. C. S., John Rhea Barton Professor of Surgery, University of Pennsylvania, Benjamin A. Thomas, A. M., M. D., F. A. C. S., Professor of Genito-Urinary Surgery in the Polyclinic Hospital and College for Graduates in Medicine; Instructor in Surgery, University of Pennsylvania, and Stirling W. Moorehead, M. D., F. A. C. S., Assistant Surgeon to the Howard Hospital, Philadelphia, Pa. *Tenth edition.* Philadelphia and London: J. B. Lippincott Company, 1917. $7.00 net.

The ever-increasing worth and popularity of this splendid work is emphasized by the appearance of a new and tenth edition. For this "the authors have felt that the work must be reset, rewritten and reillustrated to fairly and yet succinctly present the views and practices of today." And admirably has the task been done.

The volume begins by describing methods of examination of patients and of such exudative products of patients as are of clinical importance. With this is combined intelligent advice regarding the choice, the care and the sterilization of the instruments necessary for these purposes. An important and valuable chapter is devoted to cystoscopy. Thereafter follows a consideration of the diseases, including those of a functional nature, that afflict the organs in the genito-urinary tract.

The discussion of each topic is full and adequate, pleasingly written, sufficiently and at times profusely illustrated by excellent drawings, photographs and colored plates, and are marked by a lucidity of expression that is exceptional. One is pleased by the feeling that one is reading a work on surgery, and in certain of the chapters (gonorrhea, etc.) the sense of repulsion which ordinarily is associated with the discussion is totally wanting. Operative technic is well described and illustrated. Where indicated, more than one method is given and the advantages and disadvantages of all are clearly pointed out. Several of the chapters are deserving of special notice and praise, those devoted to the kidney, the bladder and the prostate and those devoted to essential laboratory subjects which have to do with diagnosis or therapy.

Almost a fourth of the book is devoted to syphilis. Here again the same excellence prevails. Each organ or group of associated organs is taken separately and the luetic manifestations to which it is subject is described.

The task of the reviewer has been both simple and complex. For it is difficult to review a book and to abstract its contents when everything is so well done and so concisely written. Much easier by far is it to say to those interested that it should all be read and absorbed. For the student the book is indispensable, for the practitioner invaluable.

Impotence and Sterility. With Aberrations of the Sexual Function and Sex-Gland Implantation. G. Frank Lydston, M. D., D. C. L., formerly Professor of the Surgical Diseases of the Genito-Urinary Organs in the Medical Department of the State University of Illinois, Member of the American Urological Association, Fellow of the American Medical Association, Member of the Society of Authors, England, etc. Octavo; 333 pages; 4 illustrations. Chicago: The Riverton Press, 1917. $4.00.

The subjects discussed are the aberrant and imperfect differentiation of sex, the diseases of the sexual function and instinct, including the perversions and inversions, the varieties of impotence and asexualization and the causes of sterility in both sexes. The monograph is finally completed by a discussion of sex-gland implantation and the latter includes a description of much experimental work done by the author.

It must be conceded that a great many of the ills which are referred to the genital organs and which are marked by disturbances of the normal functions are accompanied, if not based upon, and certainly much magnified by processes which originate in the cerebral cortex. A knowledge of the psychological processes which distinguish the human element are of extraordinary importance in a sensible comprehension of the biologic sequence of events.

The finding of an abnormality in the anatomical structure, in the opinion of the author, has always furnished adequate etiological explanations for all of the common disturbances. It seems to us, however, that the purely human element has not always been sufficiently emphasized, especially in the treatment of these unfortunate patients. Perhaps that is why sex-gland implantation, discussed so ably and urged so earnestly, has not found a broader field of usefulness among the members of the profession.

The essentially human prudery which surrounds a subject of this nature has in latter years been rudely shattered by a number of men loudly calling for a dignified discussion of the fundamental function of life. The volume before us attempts this anew.

Bacteriology, General, Pathological, and Intestinal. By Arthur Isaac Kendall, B. S., Ph. D., Dr. P. H. Professor of Bacteriology in the Northwestern University Medical School, Chicago, Ill. Octavo; 651 pages; 98 illustrations and 9 plates. Philadelphia and New York: Lea & Febiger, 1917. $4.50.

As the author indicates in his preface this volume attempts to emphasize that bacteriology has made great strides but that the problems of immunity, so intimately related to this subject, may be solved by a real knowledge and understanding of the chemistry of cellular activity as directly influenced by bacteria. Folin has termed bacteria as "living potential reagents" and in this sense the study of bacteriology takes on a fresh significance and new relationship to biology in general.

The first section of the book deals with general bacteriology. Morphology, physiology, chemistry, metabolism are discussed, each in a single chapter. The general phenomena of immunity are treated briefly but clearly and quite adequately for a book so limited in size. The discussion on anaphyloris brings the reader down to the work of Jobling and Petersen. Serum reactions and antigens are described as well as the various types of immunity response, and the book then goes on under section subheads to present the well-known and classified groups of bacteria, their characteristics, their points of differentiation, their importance in the world of biology. The author does not emphasize Rosenau's research on the possibility of a selective, specific function of bacteria when infections of organs occur. The work of Docbez and Avery on pneumococci is explained amply. The practical value of serum diagnosis in gonorrhea, glanders and tuberculosis is not touched upon at sufficient length. Plotz' discovery of the bacillus typhus exanthematici is included.

Section three is a small one on higher bacteria, molds and yeasts, etc.; section four is on gastro-intestinal bacterial flora; section five is on applied bacteriology.

The volume is well illustrated in the essential points related to this subject. It does not pretend to be an exhaustive treatise but it succeeds in pointing out that bacteriology has a clear and purposeful relationship with biological chemistry and physiology.

Pulmonary Tuberculosis. Maurice Fishberg, M.D., Clinical Professor of Tuberculosis, New York University and Bellevue Hospital Medical College, Attending Physician, Montefiore Home and Hospital for Chronic Diseases, New York. Octavo; 639 pages; 91 engravings and 18 plates. Philadelphia and New York: Lea & Febiger, 1917. $5.00.

This is an exceedingly well conceived and well written book, admirably supplying the general etiology, diagnosis, prognosis and treatment of pulmonary tuberculosis.

The plan of the volume is new and valuable. The first chapters take up a consideration of the tubercle bacillus and tuberculosis infection; also the epidemiology of this disease, a subject in which the author is an established authority. Each symptom of pulmonary tuberculosis is then considered separately and quite thoroughly. The chapter on hemophysis deserves special mention. The subject of physical signs is well presented, unessentials are avoided and the text is profusely illustrated with helpful engravings and roentgenograms. The chapter on pulmonary tuberculosis in children should be of value to pediatricians as well as practitioners in general. It indicates the rôle of early infection to diminished susceptibility in adult life, it points out the distinguishing characteristics of child infection with reference to gland involvement, for instance, also its frequent and definite clinical course of general septicemia, its rather well accepted appreciation of the portals of entry and finally the signs and symptoms of the disease which concern the child chiefly.

The chapters on fibroid phthisis contain a good deal of instructive information; the accompanying skiagraphs are good.

The final chapters are devoted to hygiene, prophylaxis and treatment and many valuable hints as to diet, climate, symptomatic treatment, specific treatment and artificial pneumothorax. An index of authors and an index of subjects complete the volume.

The work shows evidence of a painstaking and full knowledge of the subject. It holds innumerable suggestions and a mass of facts clearly presented and adequately discussed. It should remain for some time an authoritative exposition of the subject of pulmonary tuberculosis.

A Treatise on Regional Surgery by various authors. Edited by John Fairbairn Binnie, A.M., C.M., F.A.C.S., Kansas City, Missouri. In three volumes: *Volume 2;* Octavo; 656 pages; 213 illustrations. Philadelphia: P. Blakiston's Son & Co., 1917.

This, the second volume of this series, continues with the descriptions of the surgical diseases of the abdomen, the genito-urinary system and the spine. The collaborators include the best of the surgeons in America and England.

Volume two is vastly better than volume one, though here and there, some of the same defects appear. Some of the sections are written in the simple manner appropriate for the medical student; others include opinions of the writers and are evidently intended for the mature student or for those with an active practicing interest in the subject involved.

Notable for its excellence is the article on the appendix and the group of articles devoted to the genito-urinary system. There will be many surgeons, however, who will take issue with Ochsner when he says that "Patients with acute appendicitis should be operated upon provided they come under treatment while the infectious material is still confined to the appendix." In the hospitals to which the reviewer has had access appendicitis cases are operated upon as soon as the diagnosis is made, and the spreading of infectious contents by perforation or otherwise has never been considered a bar to operation but, rather, a condition which makes operation all the more imperative.

A rather good discussion of gastric and duodenal ulcer is marred by an almost total absence of emphasis upon the value of the Roentgen ray in diagnosis. The discussion of the treatment of chronic ulcer could, also, have been dilated upon with advantage.

The sections devoted to the genito-urinary tract are very complete and very excellent.

Dream Psychology. By Maurice Nicoll. Duodecimo; 194 pages. London: Henry Frowde and Hodder & Stoughton, at the Oxford Press, 1917. $2.00.

Dream psychology owes very much to the pioneer work of Freud. But as was to be expected the development of interest in the subject has brought about divergencies of opinion in matters of interpretation and analysis. Among those who have evolved a school of their own differing considerably from the Viennese point of view is the group that has clustered about Jung of Zurich.

Nicoll's book is designed to present the psychological theories involved in an understanding of the psyche. The development of symbolism and interpretation are well presented and the machinery of the phantasy-building system is described in such a way as to indicate its value as a protective compensatory system instead of as a mere wish fulfilment as predicated by Freud. The discussion of the unconscious motive and interest is excellent and tends to indicate that the main problem in life is the proper use of interest, the utilization, expression and application of which is the main concern of the unconscious.

The chapters devoted to the control and growth of interest point out the wider significance of Zurich theorists, in the interpretation of dream manifestations. The problems of extroversion and introversion are presented with clarity and succinctness.

While the Freudian conception of the unconscious apparently concerns itself with repressions that analysis seeks to liberate the interpretations are mainly sexual. In this idea there is a narrowness which makes it unacceptable to the followers of Jung who yield a wider field of service and responsibility to unconsciousness. The dream state is a factor in securing an expansion of unconsciousness and in a sense represents the shadow of an unconscious interest.

Pathogenic Microorganisms. By William Hallock Park, M.D., Professor of Bacteriology and Hygiene, University and Bellevue Hospital Medical College, and Director of the Bureau of Laboratories of the Department of Health, New York City; and Anna Wessels Williams, M.D., Assistant Director of the Bureau of Laboratories of the Department of Health; Consulting Pathologist to the New York Infirmary for Women and Children. Assisted by Charles Krumwiede, Jr., M.D., Assistant Director of the Bureau of Laboratories; Assistant Professor of Bacteriology and Hygiene in the University and Bellevue Hospital Medical College, New York City. *Sixth Edition.* Octavo; 709 pages; 218 illustrations. New York and Philadelphia: Lea & Febiger, 1917. $4.75.

This edition, to which various collaborators have made contributions, shows a general revision and some rearrangement. The subject of immunity has been especially revised; and there are new sections dealing with preventive inoculations. Altogether, the book has been brought up to the hour and may be recommended as a standard reference work.

Practical Dietetics With Reference to Diet in Health and Disease. By Alida Frances Pattee, Graduate, Department of Household of Arts, State Normal School, Framingham, Mass.; Late Instructor in Dietetics, Bellevue Training Schools for Nurses, Bellevue

Hospital, New York City. *Eleventh Edition;* Duodecimo; 552 pages. Published by the Author. Price, $1.75.

The eleventh edition of any book suggests that it has satisfactorily met a distinct need. The present edition indicates that considerably new revision has been done. The contents are designed particularly to correspond with the state requirements in dietetics for nurses.

The sections of the book dealing with hospital dietaries have been enriched by the addition of more diet lists and the discussion of methods of nutrition during illness that have been designed to meet specific conditions. This compilation of material is sufficiently inclusive to be of distinct advantage to medical men desirous of having a book on general dietetics that contains practical dietaries. As a whole the book is a distinct improvement over previous editions.

It is strange to note that in the table of contents reference is given to an Introduction said to be on Page xv. which introduction is not contained in the eleventh edition.

Modern Dietetics. By LULU GRAVES. Duodecimo; 202 pages. St. Louis: THE MODERN HOSPITAL PUB. CO., 1917.

The numerous problems involved in food conservation are of interest not merely to dietitians but to those responsible for institutional management and dietetic practices. Miss Graves has compiled an excellent series of articles which appeared in *The Modern Hospital,* with such alterations as were deemed necessary to make them more practical and more useful for general workers in the field of home and hospital management. To students of nutrition the book will be of distinct value although its particular field of service lies among physicians, hospital superintendents, students of medicine and nursing.

St. Luke's Hospital Medical and Surgical Reports (New York City.) *Volume 4,* 1917; Octavo, 404 pages, illustrated. East Stroudsburg, Pa.: THE PRESS PUBLISHING COMPANY.

This volume contains a number of medical, surgical and laboratory papers some of which have already appeared in print. Among the interesting articles are the following: Poisoning by Mercuric Chloride and its Treatment, by S. W. Lambert and H. S. Patterson; A Report of a Series of Pneumococcus Pneumonias, by L. F. Frissel and L. W. Famulener; and Blood Tranfusion and Regeneration in Pernicious Anaemia, by K. M. Vogel and U. F. McCurdy.

Very valuable is the part devoted to a description of the laboratory methods in use in St. Luke's Hospital.

The Surgical Clinics of Chicago. *Volume 1, Number 4,* August, 1917. Philadelphia and London: W. B. SAUNDERS COMPANY.

This volume contains a large number of interesting clinic reports, all excellent descriptions of interesting cases with treatment. The men writing these are the leading surgeons of Chicago.

Among the articles worthy of especial interest are the following sections: The Technic of Colostomy, by Bevan; Tendon Transplantation for paralysis following Anterior Poliomyelitis, by Dyerson; The Diagnosis and Treatment of Common Duct Calculi—With Special Reference to Overlooked Common Duct Calculi, by Eisendrath.

Progressive Medicine. Edited by H. A. HARE, M.D., Professor of Therapeutics, Materia Medica and Diagnosis in the Jefferson Medical College, Philadelphia; assisted by L. F. APPLEMAN, M.D., Instructor in Therapeutics, Jefferson Medical College, Philadelphia. September 1, 1917. Philadelphia and New York: LEA and FEBIGER.

This volume contains the following reviews: Diseases of the Thorax and Viscera, including the heart, lungs and blood vessels, by William Ewart; Dermatology and Syphilis, by William S. Gottheil; Obstetrics by E. P. Davis, and Diseases of the Nervous System, by William G. Spiller. All these reviews maintain the high average of previous numbers of this valuable quarterly.

Elements of Field Hygiene and Sanitation. By JOSEPH H. FORD, B.S., A.M., M.D., Colonel, Medical Corps, U. S. Army. Duodecimo; 248 pages; 152 illustrations. Philadelphia: P. BLAKISTON'S SON & Co., 1917. $1.25.

This compact and authoritative manual, published with the approval of the Surgeon General, is recommended to army medical officers.

Collected Papers of the Mayo Clinic, Rochester, Minn. Edited by MRS. M. H. MELLISH. Volume VIII., 1916. Octavo; 1014 pages; 411 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY, 1917. Cloth, $6.50, net; Half Morocco, $8.50, net.

This, the eighth annual volume, the tenth volume in all of the collected papers of the Mayo Clinic, includes all but a few of the publications from that clinic in 1916. Mrs. Mellish has edited, and the publishers have printed it with the same care as marked the preceding volumes.

Books Received

Diagnosis from Ocular Symptoms. By MATTHIAS LANCKTON FOSTER, M.D., F.A.C.S., Member of the American Ophthalmological Society; Ophthalmic Surgeon to the New Rochelle Hospital. Octavo; 490 pages. New York: REBMAN COMPANY, 1917.

Case Histories in Obstetrics. By ROBERT L. DENORMANDIE, A.B., M.D., F.A.C.S., Assistant in Obstetrics, Harvard Medical School; Assistant Physician, Boston Lyin-in Hospital; Surgeon to the Gynecological Department of the Boston Dispensary. *Second Edition.* Octavo; 516 pages. Boston: W. M. LEONARD, 1917.

Therapeutic Exercise and Massage. By C. HERMANN BUCHOLZ, M.D., Orthopedic Surgeon to Out-Patients, Director of the Medico-Mechanical and Hydrotherapeutic Departments of the Massachusetts General Hospital, Boston, Mass.; Assistant in Orthopedic Surgery, Harvard Medical School. Duodecimo; 427 pages; 89 illustrations. Philadelphia and New York: LEA & FEBIGER, 1917.

The Internal Secretions. By E. GLEY, M.D., Member of the Academy of Medicine of Paris; Professor of Physiology in the College of France, etc. Translated from the French and edited by MAURICE FISHBERG, M.D., Clinical Professor of Medicine, New York University and Bellevue Hospital Medical College; Attending Physician, Montefiore Home and Hospital for Chronic Diseases. Duodecimo; 241 pages. New York: PAUL B. HOEBER, 1917. $2.00.

First Aid and Emergency Treatment. By A. C. BURNHAM, M.D., Medical Corps, U.S.R.; Instructor in Surgery, Polyclinic Hospital, N. Y. City, etc. Duodecimo; 307 pages; 162 illustrations. Philadelphia and New York: LEA AND FEBIGER, 1917. Cloth, $2.00.

The Prescription. By OTTO A. WALL, PH.G., M.D., Professor of Materia Medica, Pharmacognosy and Botany in the St. Louis College of Pharmacy; Member of the Committee for Revision of the Pharmacopoeia of the United States, 1880-1890 and 1890-1900; Presiding Officer of the United States Pharmacopoeia Convention of 1910. *Fourth Edition.* Octavo; 274 pages; illustrated. St. Louis: C. V. MOSBY COMPANY, 1917.

Diseases of the Skin. By RICHARD L. SUTTON, M.D., Professor of Diseases of the Skin, University of Kansas School of Medicine; Member, American Dermatological Association; Assistant Surgeon, United States Navy, retired; Dermatologist to the Christian Church Hospital. *Second Edition.* Octavo; 1021 pages; 841 illustrations. St. Louis: C. V. MOSBY COMPANY, 1917.

Progress in Surgery

A Résumé of Recent Literature.

The Treatment of Gunshot Wounds of the Abdomen, with a Summary of 500 cases. A. L. Lockwood, C. T. Kennedy, and R. B. MacFie, *British Medical Journal,* March 10, 1917.

1. Wounds of the large vessels to the liver, kidney, and spleen are fatal before they can come to operation. Wounds involving the pancreas are seldom seen on the operating table, by reason, perhaps, of the contiguity of the organ to large vessels; only one case was seen here. In that a foreign body was lodged in the tail of the pancreas.
2. Antero-posterior wounds, especially in the epigastrium, are least dangerous, and wounds from side to side, especially low down, are dangerous.
3. Wounds of solid viscera are not so dangerous as those of hollow viscera.
4. Cases that come to operation with a herniated loop of bowel exposed do badly, especially if much bowel is lying exposed; the same is true when the stomach is partially herniated.
5. Wounds of the stomach, colon, and especially the small intestine, require exploration, but in posterior wounds involving the colon the greatest care should be taken not to convert a retroperitoneal condition into an intraperitoneal one.
6. Wounds of the liver and kidney should be carefully determined as such only, and then treated expectantly, doing no more than exploring and cleaning up the track, and not that if probably a through-and-through wound produced by an undistorted rifle bullet or shrapnel ball.
7. Avoid resection.
8. End-to-end anastomosis is preferable to lateral when resection is essential.
9. Wounds of the diaphragm are not necessarily fatal, nor even to be greatly feared. Careful repair gives excellent results.
10. Multiple drainage tubes are rarely necessary, and always to be avoided if possible.
11. Abdominal lavage is a dangerous practice.
12. Never leave free, unprotected gauze in the abdomen.
13. Paul's tube should be relegated to the museum, except in very rare cases.
14. Speed in operating is essential, not only for the benefit of the patient, but because of the demands of scores of less vitally wounded men requiring attention during an active offensive.
15. Resection for faecal fistula is better done late when the patient is in England.

Surgical Shock and Some Allied Conditions. The Medical Research Committee. *British Medical Journal,* March 24, 1917.

The committee investigating shock offer some very interesting facts. It has been definitely proven that in shock there is a pronounced aligemia due to loss of plasma which passes into the tissues. The proportion of red blood cells to plasma is much higher than normal, while the hemoglobin is much increased. The practical import of this observation is far-reaching. In the first place, a hemorrhage will contribute greatly to the production of shock in a patient in whom such a condition is imminent. The committee also deprecate the severe purging and abstinence of food and especially water before operation. As a further prevention against shock, the committee recommends physiological saline solution. In regard to treatment, the committee says that both on experimental and practical grounds adrenalin is contraindicated. On the other hand, pituitary extract is of pronounced benefit. They also recommend hypertonic salt infusions, preferably with some calcium salt added; Ringer's solution is specially applicable for this purpose.

Gunshot Fractures of the Shaft of the Humerus. Joseph R. Eastman, Indianapolis. *Journal of the American Medical Association,* July 28, 1917.

Eastman, gives his experience with 500 cases of gunshot fractures of the humerus observed in an Austrian military hospital. Nearly every gunshot fracture of the bones of the extremities is compound and infected, and the question of treatment is therefore a more difficult one. Four measures are of value: (1) reposition brought about in the most gentle and cautious manner; (2) the most precise and uninterrupted immobilization undisturbed by change of dressings; (3) a supporting apparatus, allowing free access to the injury; (4) such apparatus as requires the least technical skill and experience. The obstacles in the way of securing good immobilization of gunshot fractures in the humerus are sometimes insurmountable and the infection must be treated without regard to the position of the fragments at first; but in most cases immobilization is possible and extension also, even if it be only gravity extension due to the downward pull of the heavy swollen member. Drainage is better when the bone ends are in proper position and the reposition of fragments is easier before the scar formation has hardened and shortened the soft parts. In many gunshot humerus fractures circular constriction of the arm seems best to be avoided and the added weight of a plaster cast or the heavy wire splints allowing free access to the wound gives traction by the gravity pull alone. Eastman illustrates some of these splints. More important, however, is the principle that each case requires individual consideration and the splints must be adapted to the special need. In treating the infection and removing infected clothing fragments, etc., it is often desirable to use hot wet antiseptic dressings and this can be done with the Thomas splint. Dakin's neutral solution of chlorinated soda has proved of great value. It is cheap and highly bactericidal. Bedridden cases with extensive infection may be treated by a continuous through and through irrigation, as in infections of the lower limb. A solution of aluminum acetate (Burow's solution) is also popular in Austria for the continuous bath. The open method of treating fracture wounds has been of great value, avoiding frequent painful changing of dressings, etc. In good weather the exposure of infected gunshot wounds to sunlight for several hours daily has been utilized. After infection has subsided more forcible methods can be used in those cases of severe infection demanding postponement of all efforts to correct deformity until fixation of the fragments in faulty position has become so firm as to exclude extension treatment, open operation is the only resort. The Lane plate, wiring, bone peg and dowel graft methods are all useful in appropriate cases. Eastman mentions more especially the Lane plate as more generally useful in many cases. It has the advantage of being more easily removed in case of reinfection which is greatly dreaded by the Austrian surgeons.

Suspension with Extension in the Treatment of Fractures of the Limbs. Joseph Blake, Paris France. *The American Journal of Orthopedic Surgery,* September, 1917.

This is a reprint from the original article in *Archives de Medecine et de Pharmacie Militaires,* 1916 and recounts in detail the nature and methods of application of the apparatus in use. To those interested it is recommended that the original article be read.

The advantages of this method are that the healing takes place as rapidly as, if not more so, than with other methods and with more comfort to the patient. There is better facility for dressings. The range of motion in the articulations is recovered much more quickly since these can receive attention while the fractures are healing. There is sufficient economy of dressing materials to reimburse one for the initial outlay of the apparatus.

An Experimental Study of the Effect of Sunlight Upon Repair of Fractures. Harold Neuhof, New York. *Interstate Medical Journal,* August, 1917.

The experiments were made upon rabbits and the conclusions reached are as follows:

Sunlight has a demonstrable reparative effect upon fractures due to an ill-understood action on the tissues and is evidenced by an acceleration of the reparative process at the fractured ends and an increase in the reparative zone. This is observable as early as eleven days after exposure to the sun's rays

The practical significance of the experiments lies in the demonstration that this effect can be promptly obtained.

The action of sunlight depends upon its violet and ultraviolet rays and the question of the effect of ultraviolet light as a substitute for sunlight deserves investigation.

Fractures of the Neck of the Femur in Children. H. L. TAYLOR, New York. *New York State Journal of Medicine,* November, 1917.

The typical fracture of the neck of the femur in children up to thirteen is a hinge fracture at the junction of the neck with the shaft. Taylor calls it a "hinge" fracture, because the periosteum acts as a hinge, permitting angular displacement in adduction, but preventing displacement *en masse.* From thirteen to sixteen the typical injury is a fracture at or near the epiphyseal line, with marked displacement. Above sixteen, the type of fracture is the same as in adults. The treatment consists in reduction, which in recent cases may be done without ether, and fixation in adduction in a plaster of Paris spica extending from the chest to the toes.

Dislocations of the Shoulder, With a Few Complications. F. F. HENDERSON, Boston. *Boston Medical and Surgical Journal,* October 18, 1917.

In 19 of 32 cases, there was a fracture of the greater tuberosity; three showed fractures through the anatomical neck, the remaining ten showed nothing by X-ray. In nearly every dislocated shoulder, after a month's duration, there is a considerable arthritic change, leading occasionally to the formation of an exostosis. After healing, the outward and upward motion is difficult or painful. This is due partly to the arthritic changes, and partly to callous production in and around the joint. The treatment of cases with fracture is not easy. Henderson recommends open operation and reduction of the fractured tuberosity, when the reduction cannot be obtained otherwise. The open operation is also indicated when smaller fragments are torn off and carried into the joint, and when exostoses form. When there is no marked displacement resulting from the fracture, the arm is placed to the side, a shoulder cap is applied and a double sling. After union, massage, passive motion and electricity are indicated.

Antitoxin for Gaseous Gangrene. CARROLL G. BULL, New York. *New York Medical Journal,* November 3, 1917.

Briefly reviewing his work in isolating the toxin of b. Welchii and preparing an antitoxin, Bull summarizes:

1. Twenty-nine strains of the bacillus Welchii group have been found to produce toxins which are qualitatively indistinguishable.
2. It has been possible to confer on guineapigs a passive immunity of about two weeks' duration to bacillus Welchii toxin through a protective administration of the antitoxin.
3. Guineapigs which had received a prophylactic dose of bacillus Welchii antitoxin exhibited pronounced resistance to infection with the virulent bacilli for a period of twelve days.
4. The opinion has been expressed that it will be possible to prevent gas bacillus infections in man through a protective use of antitoxin, and that developed cases of the infection may be controlled by therapeutic application of the same agent.
5. A few cases of gaseous gangrene in man have been treated in which the efficacy of the antitoxin was unmistakable.

Observations on Gas Bacillus Infection in France. J. R. JUDD, Honolulu. *Surgery, Gynecology & Obstetrics.* August, 1917.

Modern trench warfare with the accompanying difficulties in providing cleanliness exposes a large proportion of wounded to the dangers of gas-bacillus infection. Shell wounds are the cause of the infection in a majority of the cases; a piece of contaminated clothing carried into the depths of the wound by the projectile provides the infective agency. The bacilli perfringens is the generally accepted microorganism causative of this type of infection. These bacilli appear in the wound from the ninth to the twelfth hour. The aerobic bacteria appear about the forty-eighth hour.

The symptoms of the infection appear early, usually on the second day. The parts of the body most often affected are the legs on account of the likelihood of their becoming contaminated by dirt and fecal matter. It is of vital importance that diagnosis be made early. Pain, swelling and tension of the wound with rapid pulse are important early symptoms. Vesicles, discoloration of the skin, gas formation and odor should be considered later symptoms.

The prognosis depends on whether the patient receives early proper treatment. French hygiene and personal cleanliness are vital prophylactic measures. Early incision of the wound with removal of the foreign bodies, cleansing of the wound and excision of damaged tissue doomed to slough are the correct surgical procedure of prevention. When the infection is once established, well placed, deep incisions exposing the deeper tissues to the air are indispensable. For the clinical treatment of the wound, Dakin's solution has given the best results. Amputation must be resorted to in many cases and should not be delayed beyond the proper period.

War Tetanus. L. H. CORNWALL, New York. *New York Medical Journal,* October 27, 1917.

1. Tetanus is a common scourge of war.
2. In the present war there have been more cases of tetanus per 1,000 than in any previous war.
3. Tetanus develops after wounds contaminated by dirt and clothing and is more frequent after wounds of the extremities than those of other regions.
4. The usual incubation period is from six to sixteen days, but in tardy tetanus may be prolonged to three months.
5. Low temperatures and free excess of oxygen prolong the period of incubation.
6. The onset is frequently so insidious as to render early diagnosis difficult.
7. The pathway of the infection is along the perineural lymph channels to the spinal cord.
8. Early prophylactic injection of antitoxin should be given in every wound contaminated by dirt or particles of clothing.
9. For therapeutic purposes the serum should be given subcutaneously, intravenously, intraspinally, and endoneurally.
10. To prevent the muscular fatigue due to spasms and convulsions sedatives are of great value and absolute rest is of paramount importance.
11. So called tardy tetanus may occur as late as three months after injury and is especially likely to follow secondary surgical operations or other trauma at or near wounds previously infected with tetanus bacilli.
12. The prognosis is grave when the disease develops early, but late cases have a favorable prognosis.

Carcinoma of the Umbilicus. M. G. WOHL, Omaha. *Boston Medical and Surgical Journal.* September 27, 1917.

Wohl reports the case of a woman who presented herself with a tumor of the umbilicus. At operation, the mass was found adherent to a primary tumor in the transverse colon. Pathological examination of the umbilical mass showed it to be an adeno-carcinoma secondary to the tumor of the intestine. Wohl brings out the significant fact that the umbilical tumor developed long before the primary intestinal carcinoma gave any signs. "Therefore any lump in the umbilicus should be seriously considered and the probability of its being secondary to an abdominal tumor borne in mind."

(The reviewer has seen a number of instances of similar character, and can emphasize the point that Wohl makes.)

Substitution of the Anal for the Vesical Sphincter in Certain Cases of Inoperable Vesicovaginal Fistulae. REUBEN PETERSON, Ann Arbor. *Surgery, Gynecology and Obstetrics.* October, 1917.

Experimental work and a study of the reported cases show that the rectum can be used as a substitute for a urinary bladder without giving rise to rectal irritation. An opening large enough to admit two fingers is made in the recto-vaginal septum just above the internal anal sphincter. The mucous surfaces of the rectum and vagina should be united by interrupted chromacized catgut or silk sutures and the vesical and vaginal portions about the fistula should also be united by interrupted catgut sutures so that there should be permanent patency of the openings. The vaginal introitus is then closed thus converting the rectum into the new reservoir for the urine. The patients do well following the operation being able to control urination to every three hours or longer and do not suffer from diarrhea. The only disadvantage in married women is the impossibility of copulation.

Ligation or Excision of the Pelvic Veins in the Treatment of Puerperal Pyemia.

C. Jeff Miller, New Orleans. *Surgery, Gynecology and Obstetrics.* October, 1917.

One hundred and ninety-seven cases of puerperal pyemia for the relief of which ligation of pelvic veins without or with incision has been done, is reviewed by Miller. He follows the same classification as Williams in a previous review of this subject. Of the total series fifteen were treated by the extraperitoneal and 182 by the transperitoneal route. The latter is far preferable. The gross mortality not including the vena cava thrombosis series, was 51.6 per cent. The corrected mortality, that is after deducting hopeless, moribund cases, cases of extensive cava thrombosis, acute peritonitis, faulty ligation of vessels, broad ligament abscess and multiple metastatic processes, was found to be 33.9 per cent. Miller has arranged his cases in such fashion that the details of these deducted cases are open to supervision by any investigator. Considering the fact that the conservative treatment of puerperal pyemia has a mortality between 60 and 70 per cent, the operative method appears to have decided advantages on its side. It is interesting to note that the active symptoms subside after operation in 25 per cent of the cases. As to the technique, whether the thrombosed vein is to be simply ligated or excised depends upon circumstances. In pure septic thrombosis, ligation of the involved vein is considered sufficient. The ideal operation would demand the removal of the infected focus, or else the closing off of every outlet of bacteria, but neither is possible. Excision should be reserved for periphlebitic processes. or when the thromboses vein presents areas of softening which appear likely to lead to perforation.

The Placenta Regarded as a Gland of Internal Secretion.

Robert T. Frank. *Surgery, Gynecology, & Obstetrics.* September, 1917.

The placenta was declared by Halban in 1905 to have a distinct specific influence on the breasts and uterus. His theory was based upon clinical and experimental evidence. According to Frank this theory has been proved by the work of investigators during the last decade. Frank has demonstrated that placental extract causes hyperplasia of transplanted portions of the uterus, as well as the uterus left *in situ*. The action is not diminished by removal of the adrenals, pancreas, or thyroid or combined removal of thyroid and adrenals. The ovaries are not stimulated by the extract. The atrophic uterus of castrated animals responds readily to the stimulus of the placental extract, even after long periods of time have elapsed. (The longest period was 16 months after castration.) The active principles obtained from the corpus luteum and from the placenta can be extracted by identical methods, chemically have identical properties and biologically produce identical results upon the uterus and breasts. The placenta has been used by Frank in his experiments because it is easier to obtain than the corpus luteum, which latter, however, yields a greater amount of the activating substance.

The potent crude extract which has been found by Frank and his co-workers to have the biologic effect described above is obtained by continuous extraction with alcohol. It is a dark semi-liquid mixture which resists high degrees of heat (350° C.), strong acids or alkalies and saponification without loss of potency. It either oxidizes or polymerizes on standing, gradually losing its activity. It is fully soluble in 95 per cent alcohol, partially so in chloroform, ether, oils, and in benzine (the active fraction at times following the benzine insoluble portion). The activity persists after removal of cholesterin and indol which may be regarded as contaminations. The active substance has not been sufficiently purified to permit of analysis.

In view of the apparent identity of corpus luteum and placental substance the question arises whether the placenta acts merely as a storage reservoir for corpus luteum secretion during the latter half of pregnancy, or whether the placenta elaborates a hormone of its own.

Complete Removal of Cancer of the Uterus by the Curette.

Palmer Findley, Omaha, *Interstate Medical Journal,* April, 1917.

Findlay reports two cases in which preliminary curetting revealed typical adeno-carcinoma. At the subsequent hysterectomy performed shortly afterward, the uterus showed not the slightest sign of malignant growth. Findlay refers to the comprehensive paper of Ladinski, published two years ago, who was the first to report such cases in this country. The number of reported cases is very few. Findlay is emphatic in not recommending curettage for cancer as a cure of cancer of the body of the uterus.

Cancer of the Breast.

Willy Meyer, New York. *Surgery, Gynecology and Obstetrics,* May, 1917.

Cancer of the breast can be cured by radical operation. Approximately 32 per cent. of the cases Meyer personally operated upon remained alive for periods varying between four and twenty-two years after operation. The ultimate fate of such patients depends less on the surgeon's work than on, 1, the degree of virulence of the original disease (infection); 2, the duration of the disease before operation, and 3, whether the diseased (infected) area is entered. Meyer urges the absolute avoidance of entering the "danger-zone" of the breast tumor in doubtful cases, as is commonly practiced in order to obtain a piece of tumor for frozen section. Here again we have a plea for early operation, as the latter offers a fair prospect for a permanent cure.

An Operation for the Radical Cure of Inguinal Hernia.

R. V. Slattery. *The Lancet,* September 22, 1917.

The importance of repairing the defect in the fascia transversalis in an operation for the radical cure of an oblique inguinal hernia has never been fully appreciated. In this region, as elsewhere, the fascia transversalis must be looked upon as part of the extraperitoneal fascial envelope of the abdominal cavity. A post-operative defect in this fascia, especially if it be left unsupported by strong muscles, invites a hernial protrusion.

1. The inguinal canal is exposed as in Bassini's operation.
2. The sac is dealt with.
3. The cord is freed from its bed and retracted.
4. The weak fascia between Poupart's ligament and the conjoined tendon is picked up with forceps and divided parallel to Poupart's ligament, care being taken not to injure the deep epigastric vessels.
5. The fascia transversalis is freed thoroughly from the retroperitoneal fatty tissue both upwards under the conjoined tendon and downwards to expose the deep aspect of Poupart's ligament.
6. The fleshy arch of the internal oblique muscle is retracted, and forceps applied to the glistening fascia on the deep aspect of the conjoined tendon so as to draw it into the wound. This fascia brings with it the lower aponeurotic portion of the transversalis muscle.
7. Mattress sutures (three or four generally suffice) are used to approximate this fused fascia and aponeurosis to the deep aspect of Poupart's ligament. The outermost suture is introduced first. Its aim is to restore the fascial internal abdominal ring, placing the restored ring under the supporting fibres of the internal oblique muscle. By carefully retracing Poupart's ligament forward and passing the needle from within outwards, to emerge where Poupart's ligament blends with the fascia lata of the thigh, these sutures are easily and safely introduced. It is also important that the remains of the fascia trans-

versalis still adherent to Poupart's ligament and the cord should not intervene between the structures opposed. This is easily avoided if this fascia is retracted forwards with Poupart's ligament. When tying the mattress suture nearest the internal abdominal ring care must be taken not to narrow that ring unduly. I have never seen pressure symptoms, although in most of my cases the reformed internal abdominal ring will barely admit the tip of one finger.

8. The cord is allowed to fall back into its bed.
9. The external oblique aponeurosis is stitched up.
10. The wound is closed.

The Advisability of Prostatectomy in the Presence of Cord Lesions.

E. S. Judd and W. F. Braasch, Rochester, Minn. *Illinois Medical Journal,* October, 1917.

Urinary incontinence after prostatectomy is not uncommonly due to cord lesions, of which investigation may show that definite evidence antedated the operation. Incontinence is frequently due to prostatic enlargement but in these cases is due to overflow. True incontinence is usually due to lesions of the cord, the most common of these is tabes. The data observed by cystoscopic examination of these patients are of much importance. The changes regarded as typical are the characteristic trabeculation and relation of the sphincters.

The subjective symptoms of these patients presented more confusion than is usual. The upper portion of the cord seemed to be more involved than the lower. Only three of nine patients gave histories of having had an initial lesion. The different nerve reactions varied from the normal to a moderate degree.

Cystoscopic examination showed that the evidence of cord lesion was overshadowed by that of mechanical urinary obstruction.

In a certain number of these cases prostatectomy was done and in some of these was followed by some relief.

Persistent Prostatic Abscess Cavities—Author's Technique for Obliteration.

Frank S. Crockett, *Indianapolis Medical Journal,* November, 1917.

Abscesses form in the prostate and may go on to cavity formation; these cavities may persist long after the rest of the prostate recovers from the initial infection and inflammation. For these Crockett advises free drainage.

The posterior urethra is cocanized and a urethroscope passed into the prostatic urethra. A finger in the rectum guides the instrument into the cavity; a knife is then passed and a stab wound made through the urethral wall of the cavity. The opening may be enlarged and the cavity explored and a few drops of 1 per cent. silver nitrate instilled; this is repeated for five to six days.

Why Do We Have Recurrences After Operations on the Biliary Tract?

Daniel N. Eisendrath, Chicago. *Illinois Medical Journal,* October, 1917.

The causes of true recurrence are: (1) Reformation of stones due to infection, or in the crypts of Luschka, either in gallbladder or in ducts; (2) in stumps of cystic duct; and (3) around silk ligatures.

The causes of false recurrence are: (1) Calculi which were overlooked or impossible to find. (2) Adhesions. (3) Chronic pancreatitis. (4) Carcinoma of head of pancreas which may have been overlooked. (5) Persistence of infection. (6) New gallbladder reservoir forming in stump of cystic duct. (7) Strictures in any part of the duct system. (8) Internal or external biliary fistulae. (9) Contraction of ampulla of Vater. (10) Mistakes in diagnosis. (11) Pancreatic calculi.

The Roentgen Diagnosis of the Pathological Gall-Bladder.

A. W. George and R. D. Leonard, Boston. *Boston Medical and Surgical Journal.* September 13, 1917.

The authors use no special technique. Intensifying screens must be used and the patient be taught to hold his breath. The tube must be of a sufficient hardness just to penetrate the patient. When the gall-bladder shadow is seen on the plate, the authors believe that such a gall-bladder is pathological.

The Absorption of Phenolsulphonephthalein from the Subarachnoid Space in Diseases of the Central Nervous System.

H. G. Mehrtens and H. F. West, San Francisco, *Archives of Internal Medicine,* October 15, 1917.

1. Phenolsulphonephthalein, when injected into the subarachnoidal space in normal persons appears in the urine in ten minutes or less.
2. Diseases of the central nervous system, especially when involving the meninges, produce a lengthening of the appearance time to as much as seventy minutes in some cases.
3. This delay cannot be accounted for by disease of the kidneys, or by the reduction of the phenolsulphonephthalein in the spinal fluid.
4. Advanced general arteriosclerosis may be a factor in causing the delay, in some instances.
5. Syphilis, a lengthening of the appearance time may be produced before any other evidence of central nervous system involvement has appeared.
6. The method may prove of value in detecting instances of organic central nervous system disease in which the ordinary spinal fluid findings are negative or incomplete.

The Modern Treatment of Burns with Especial Reference to Severe Burns and to the Use of Ambrine and Its Substitutes.

E. H. Risley, Boston, *Boston Medical and Surgical Journal.* September 13, 1917.

1. The three most important factors in the treatment of burned cases are:
   (*a*) Prevention and treatment of shock.
   (*b*) Prevention of sepsis.
   (*c*) Prevention and treatment of contractures.
2. Many deaths have been caused by ill-advised attempts at a first dressing.
3. The form of first dressing is largely responsible for subsequent sepsis. Oily dressings should be avoided Cleansing of the skin surrounding the burned area with alcohol aids in preventing sepsis. Constant drainage of discharges is essential.
4. The open air treatment is far superior to that in which any form of dressing is used.
5. Either picric acid or Tr. chlorid of iron are by far the best forms of medicated dressing.
6. Contractures can be prevented in 75 per cent of cases formerly contracting, by the early use of properly adjusted splints and by early passive motion and massage.
7. Duodenal ulcer is a rare complication and can be almost discounted.

Recently Risley has been employing ambrine or a substitute which he has devised, and is now convinced that it is the best form of treatment of burns. He analyzed the original ambrine and found that it contained 95 per cent paraffin, so he now makes a mixture containing Paraffin 90 per cent, Spermaceti 5 per cent and Ber's wax 5 per cent. First, the burn is thoroughly cleaned, blebs are pricked and pieces of loose skin are removed. The surrounding skin is cleansed with alcohol and the whole allowed to dry. When completely dry, the mixture heated to 130° F. is gently painted on the burn and surrounding skin. A thin layer of cotton is then applied and the second coat is quickly painted over this. The parts are then mobilized with a splint to prevent cracking. This dressing is repeated every day. The dressing can be easily lifted off without pain. Risley says that such burns heal more quickly than by any other method, and leave a smooth scar.

To What Extent Have the Sun's Rays an Influence in the Treatment of Bone and Joint Tuberculosis?

Albert H. Freiberg, Cincinnati. *The American Journal of Orthopedic Surgery,* September, 1917.

The author concludes that exposure to the sun's rays has a speedy beneficial effect, the latter being emphasized by the retrogression which occurs when the treatment is interrupted. It is not certain that the ultraviolet rays are the only active part of the sun's rays inasmuch as the therapeutic effect is not obtained with artificial sources of ultraviolet rays.

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